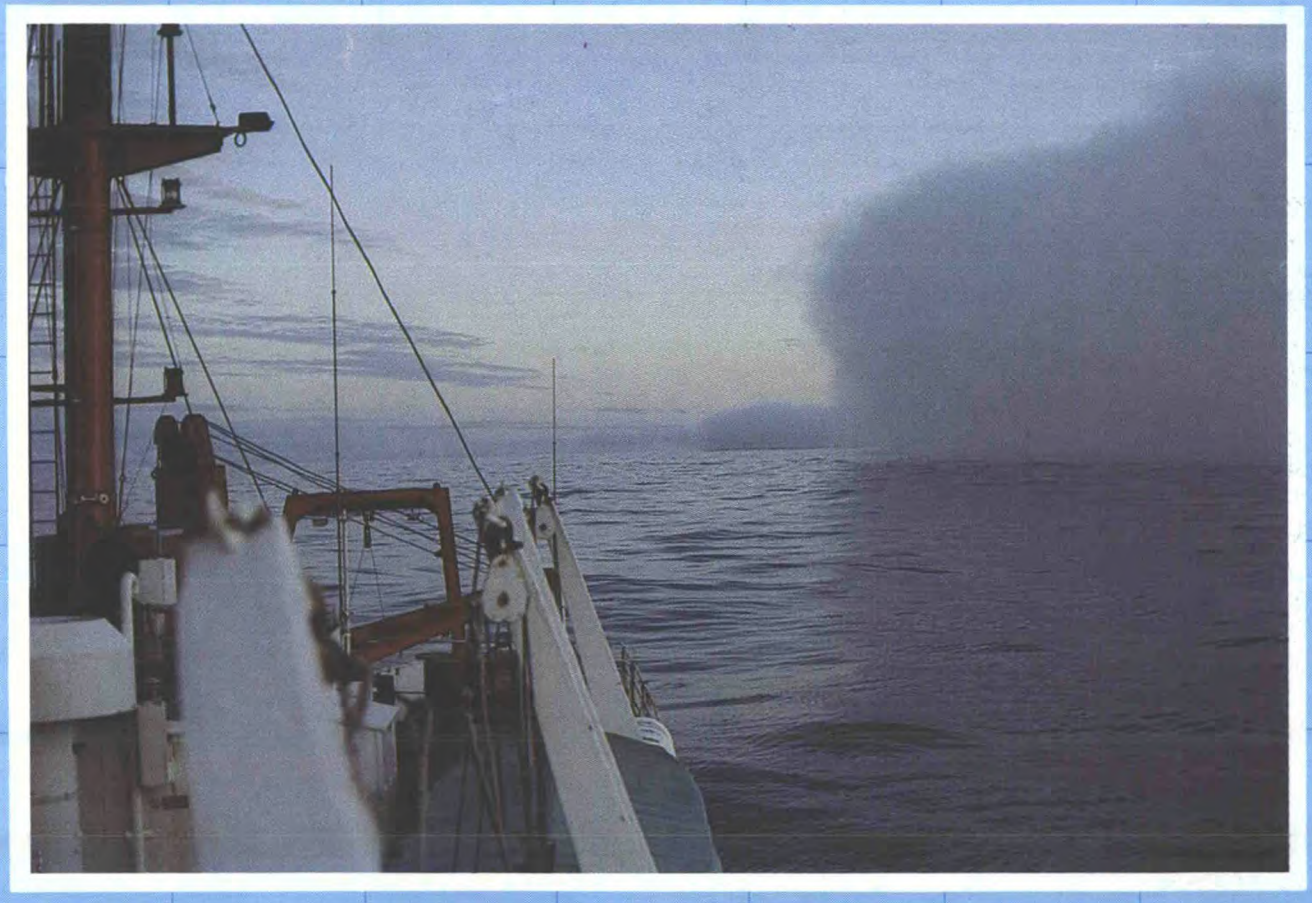
Met.O.975

The Marine Observer

A quarterly journal of Maritime Meteorology



Volume 58 No. 298
October 1987

Met. O. 975

THE MARINE OBSERVER

A QUARTERLY JOURNAL OF MARITIME METEOROLOGY PREPARED BY THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE

VOL. 57 **No. 298** **OCTOBER 1987**

CONTENTS

	Page
Editorial	**166**
The Marine Observers' Log — October, November, December	**168**
Phenomena on the sea surface, as studied from visual observations. By K.N. Fedorov and A.I. Ginzburg	**190**
Sabean Odours. By M. Hatch	**197**
Weather influences on battles and invasions. By Lt. Cmdr S.J. Auty	**203**
Presentation of barographs	**204**
Aurora Notes October to December. By R.J. Livesey	**205**
From *The Marine Observer* 40 years ago	**209**
Personalities	**210**
Book Reviews	
Violence at sea	**211**
The immortal Warrior	**212**
Ship in the Wilderness	**213**
Notices to Marine Observers	**214**
Index	**217**

COVER PHOTOGRAPH of a fog bank taken by Mr R.C. Plumley, Chief Officer on board R.R.S. *John Biscoe* in Bransfield Strait, Antarctica, 1985.

Letters to the Editor, and books for review, should be sent to the Editor, The Marine Observer, Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2UR

LONDON: HER MAJESTY'S STATIONERY OFFICE

Editorial

This could have occurred nowhere but in England, where men and sea interpenetrate, so to speak.
From *Youth*
By Joseph Conrad (1857–1924)

A young man from Lerwick in the Shetland Islands makes his way to London, impoverished at the age of 22 after service in the Royal Navy, and manages to find work with a shipbroker. They become partners and some time later set up a commerical shipping company. In this scenario, they could hardly have believed that their enterprise would be celebrating 150 years of successful operation in 1987 and that the name of the Peninsular and Oriental Steam Navigation Company would be known and respected throughout the world. Arthur Anderson would indeed be proud to know of his fine achievement, with that shipbroker named Brodie McGhie Willcox, and to see that his Scottish island home has been restored to his memory.

When Her Majesty the Queen and Prince Philip sailed down the River Thames from the Festival Pier to Greenwich on 7 July this year, they honoured not only the P. & O. Company in its 150th year but also the whole merchant service and 150 years of maritime history. Against a background of the Royal Naval College and the National Maritime Museum, the Queen was entertained aboard the cruise liner *Pacific Princess* by P. & O. Chairman Sir Jeffrey Sterling. (*See* photograph opposite page 189.)

The red, white, blue and yellow quartered house flag still to be seen on ships around the world serves to remind us of the origins of the trade which lead to the creation of the P. & O., as it combines the old colours of Portugal and Spain whence the company's services began in 1837. P. & O. has remained in the forefront of British shipping activities since then, and the Meteorological Office is proud to have been associated with the company's ships since formal weather reporting began. Observations were made first on P. & O.'s *Alma* in April 1855, only a few months after the Meteorological Department of the Board of Trade was founded under its first Superintendent, Rear Admiral Robert FitzRoy. There has hardly been a year when the majority of the fleet has not been co-operating in recording the weather observations on board. *Pacific Princess* is now supplied with British instruments for her 2-year stay in European waters although, in common with the regular U.S. west coast cruising liners, she was formally recruited for weather observing by our colleages in Vancouver.

It is reassuring to have the mutual self help that exists between Port Meteorological Officers of countries world wide, such co-operation having added importance in an era when switching of flags and operations makes it more difficult to keep track of assets. To keep ships of the U.K. observing fleet abroad supplied with the necessary items, we would like the assistance of more Port Meteorological Officers overseas, and will always reciprocate as necessary. To this end we have recently gained the agreement of the officials at Le Havre and Piraeus to hold small stocks of stationery for issue to U.K. observing ships.

The regrettable frequency of withdrawal of equipment from ships sold abroad is nevertheless usually achieved with the timely and efficient intervention of shipping company superintendents, who ensure that Met. Office property is excluded from the sale and arrange suitable transportation for safe return of the valuable instruments. It is to our great benefit that these officials are willing to take time and trouble to safeguard the property of others.

As current proprietors of the Netherlands-built weather ship *Cumulus*, the Met. Office receives occasional requests for scientists to accompany the ship on her voyages to station 'Lima' in the North Atlantic. Sometimes the normal routines are enlivened by periods of drama or modification, such as the helicopter transfer from the ship of a visiting scientist with suspected appendicitis. In this incident, the Captain had initially headed for Greenock at full speed until the R.A.F. sent a Sea King helicopter from the Lossiemouth base to rendezvous with *Cumulus* when within range. Landing of the patient, part of the team from the Oceanographic Department of the University College of Swansea, the operation and recovery were successful. Another departure from the normal occurred when the first woman ever to sail as one of the meteorological staff on a U.K. weather ship embarked on the *Cumulus* in March. Miss Valerie Maltby soon overcame her initial period of seasickness and, during her month on station 500 miles west of Scotland, she gained valuable experience and a greater understanding of the weather problems facing mariners. On return to her Bracknell office in the Marine Enquiry section of the Marine Division, she has been able to add her new-found knowledge to her scientific skills to serve the marine industry.

The usual welcome extended to Masters and Officers of the Voluntary Observing Fleet on visiting the Central Forecasting Office must regrettably be suspended until the New Year of 1988, whilst major refurbishment of the facilities is undertaken. We trust that we will be able to maintain normal services during renovations and though we cannot guarantee that 100 per cent accuracy in weather forecasts may ensue as a result of the changes, the Metroute ship routeing service will continue to share the necessary means to provide its wares to shipowners and charterers.

J.F.T.H.

October, November, December

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply instructions on how to preserve and pack such samples on request.

PASSAGE OF DEPRESSION

North Atlantic Ocean

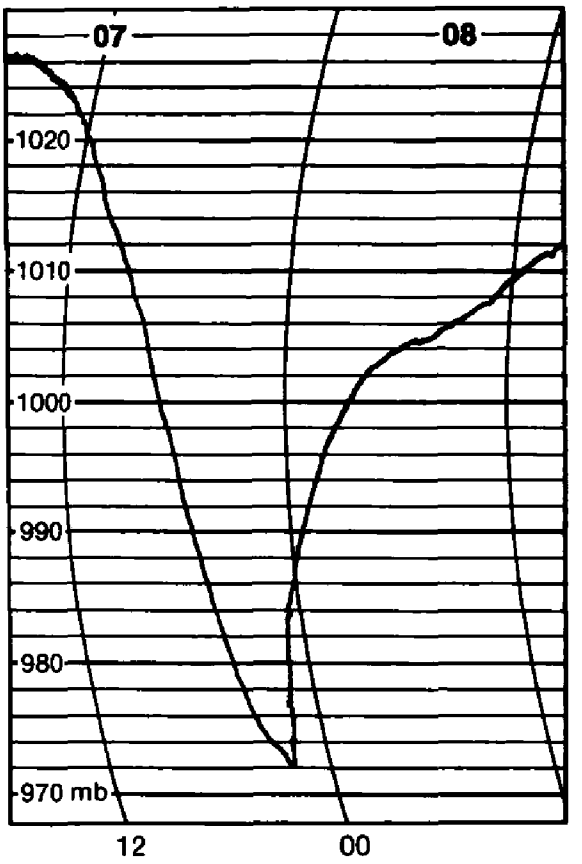
m.v. *Albright Explorer*. Captain J.H. Kitching. Portishead to Longharbour. Observers: the Master, Mr W. Hutchings, 1st Officer, Mr T. Wright, 2nd Officer, Mr S. Andrucci, 3rd Officer and ship's company.

7–9 November 1986. During this time, the vessel experienced the passage of a storm, the centre of which was estimated to be only a few miles to the south at its closest approach. The following report has been extracted from the weather log, and the barogram illustrates the pressure characteristics.

Date and time (GMT)		Wind Dir'n	Force	Pressure (mb)	
7th	1200	S	2	1029.5	
	1800	S'E	6	1017.5	
8th	0000	E	8	976.4	
	0130	Rapid backing	12+	975.1	Lowest reading
	0600	NNW	10	1001.6	
	1200	NW'W	8	1010.5	
	1800	W'N	9	1015.3	
9th	0000	WNW	8	1025.5	
	0600	WNW	6	1028.1	
	1200	NW	4	1029.5	

At 0130, whilst the ship was on a westerly course, the wind backed from 090° to 340° in a matter of ten minutes, the wind speed was estimated to be in excess of

80 knots. Wind noise on the bridge was very loud, the sea was white with blowing spray, and visibility below mast-top height was only about 150 m. The swell was confused and about 5 m high.



There followed a period of heavy rain as the wind reduced to a steady force 10. Damage was confined to the starboard bridge-wing lifebuoy, its box and smokefloat, which were all torn off their mountings and wrapped around the monkey island rails. The Stevenson screen was wrecked on its way to the monkey island.

Position of ship at 0130 GMT: 47° 56′N, 41° 30′W.

m.v. *Farland.* Captain C.R. Bamford. Port Cartier to Port Talbot. Observers: the Master and ship's company.

7–9 November 1986. Whilst on passage, the vessel experienced very heavy weather, and the following information comprises a selection of the observations made during the period.

Date and time (GMT)	Wind Dir'n	Wind Force	Dry Bulb (°C)	Pressure (mb)
7th 2100	SSE	10/11		1012
8th 0000	SSE	11		1003
0300	S'E	12		994
0600	SSE	11/12	13	988
0900	SW	12		980
1200	SW'W	12		976
1500	SW	12		978
1800	WSW	12	10	980
2100	W'S	11/12		984

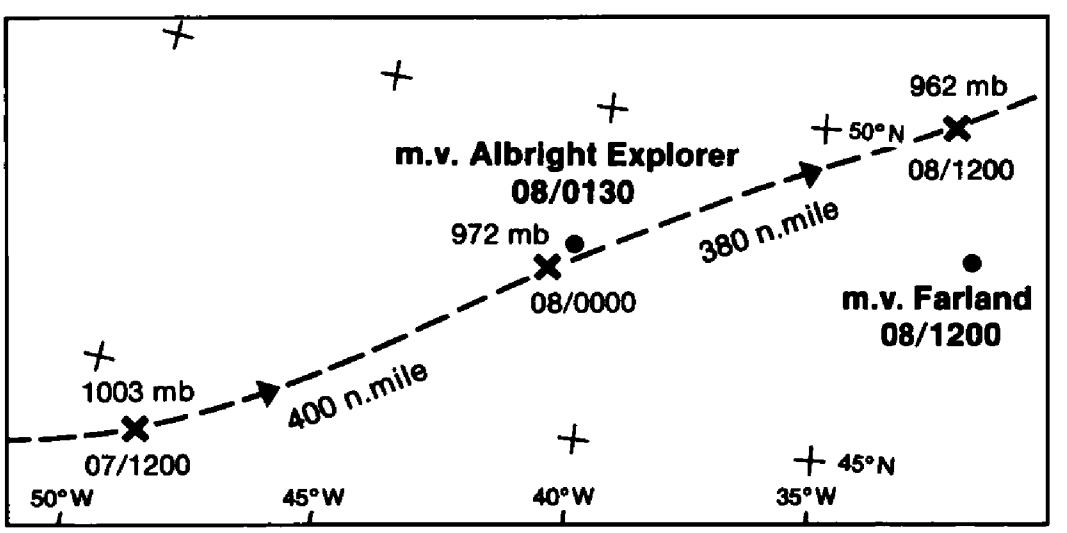
9th	0000	WSW	11		986
	0300	WSW	11	11	989
	0600	W'N	10	10	991
	0900	WNW	7/8		993

During the worst of the storm, the vessel was experiencing waves of approximately 15 m in height, the distance between them being about 300 m. A great deal of damage was caused to the vessel, which shipped seas over the poop deck several times during the period. One particular wave at 1800 on the 8th, broke over the poop deck, ripping the ship's emergency boat from its mountings and sending it crashing into the accommodation, the same wave then broke along both sides of the main deck.

Position of ship at 1200 GMT on the 8th: 47° 54'N, 31° 30'W.

Note. Mr R.D. Whyman, of the Marine Climatology branch, Meteorological Office, comments:

'On the map is plotted the central pressure of the depression at twelve-hour intervals, together with the positions of the *Albright Explorer* and *Farland* at the times of their lowest pressure readings.



'As Captain Kitching surmised, the centre of the depression passed very close to the south of his ship, as the map indicates. This low started life as a very shallow wave depression, and travelled almost 1000 n.mile between the 6th at 1200 GMT and the 7th at 1200 GMT, deepening by only 8 mb, followed by the explosive deepening by 31 mb during the next twelve hours.'

HEAVY WEATHER

North Atlantic Ocean

m.v. *Atlantic Conveyor.* Captain E.L. Jackson. Liverpool to Halifax, N.S. Observers: the Master, Mr J.K. Brocklehurst, Chief Officer, Mr M.G. Dexter, 2nd Officer, Mr A.L. Le Goubin, 3rd Officer and ship's company.

9 December 1986. Whilst on a course of 250° the vessel encountered a severe storm and associated heavy weather. The following report is derived from the meteorological and deck logbooks.

Time (GMT)	Wind Dir'n	Force	Dry Bulb (°C)	Pressure (mb)	Remarks
0000	W	10/11	+2.7	987.3	Heavy continuous rain. Seas approximately 5.5 m.
0100	W'S	10			Rain ceased. Varying amounts of Cu, Cs.
0200	W'S	10			Very heavy rain showers. Wind increasing force 11 for duration.
0300	WSW	11/12		986.1	
0400	WSW	11		989.9	Heavy snow showers. Visibility reduced to less than 1 cable in snow.
0500	WSW	11		990.7	
0600	W'S	11	−7.5	991.1	Wind gusting to 75 knots. Seas approximately 9 m, swell SW'ly, 10.5 m.
0700	W'S	11	−8.5	991.6	High seas. Short, steep, heavy W'ly swell. Snow showers.
0800	W'S	12			
0900	W'S	12			
1000	W'S	12			
1100	W'S	12+	−7.8	990.7	Very rough, mountainous seas. Very heavy swell. Frequent snow squalls.
1200	WSW	12+	−7.5	989.7	Seas estimated at 10.5 m, swell estimated at 15 m.
1300	WSW	12+		988.3	Seas/swell estimated to be in excess of 18 m. Wind in excess of 84 knots.
1400	WSW	12		988.7	
1500	WNW	11	+1.7	991.0	Frequent sleet/snow squalls. Poor visibility, slight icing observed. Very heavy W'ly swell.
1600	WNW	11		993.2	
1700	NW'W	11		994.2	
1800	NW	11	+2.3	1001.6	Seas estimated at 9 m, swell W'ly, 15 m.
1900	NW	10			
2100	NW'W	10			
2200	NW'W	9/10		1014.4	
2300	NW'W	8	0.0	1016.6	

This depression had been forecast for some time as it had deepened over the Great Lakes, and then moved eastwards over Cape Race, however, at no time prior to our entering the storm was it forecast to be more than a severe gale.

Our first indication of the severity of the storm was at 2350 on the 8th, when the front went through and the wind increased from force 8 to force 10. From then on, the wind and seas increased, causing us to reduce speed until 0530 on the 9th, when we were using maximum available revs just to maintain steerage way.

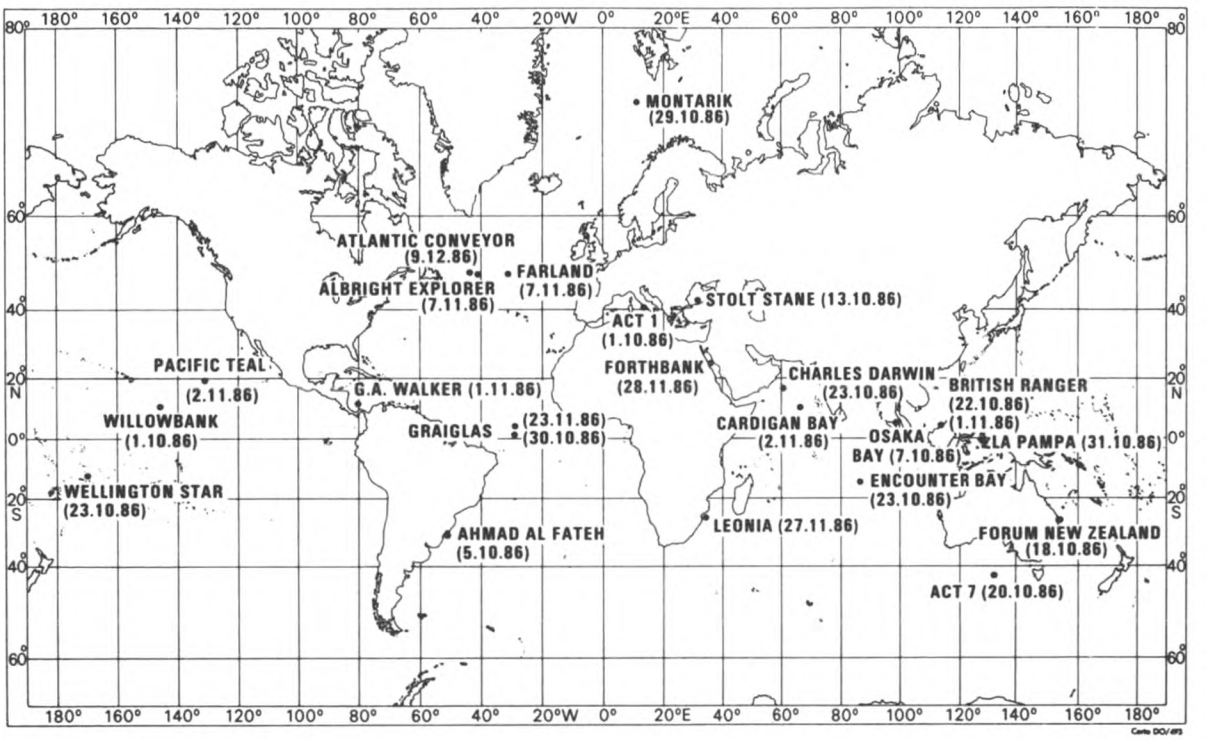
Maximum wind occurred at about 1300, when it exceeded the scale of our anemometer, i.e., 84 knots. The seas at this time were estimated by the Master and Deck Officers to be in excess of 18 m. The vessel was pitching very heavily, rolling to 40 degrees, and shipping heavy seas, the violent movement causing much cargo and some structural damage, plus injury to three people.

From 1500, the wind gradually decreased, and seas subsided, and at 2030 we were able to resume our passage, although still at a much reduced speed due to the sea conditions.

The *Atlantic Conveyor* is one of the new third generation RoRo/Container ships, 249.5 m in length and with a gross tonnage of 25 301.

Position of ship at 0000 GMT: 48° 36′N, 43° 00′W.

Position of ship at 1200 GMT: 48° 06′N, 44° 30′W.



Position of ships whose reports appear in *The Marine Observers' Log*

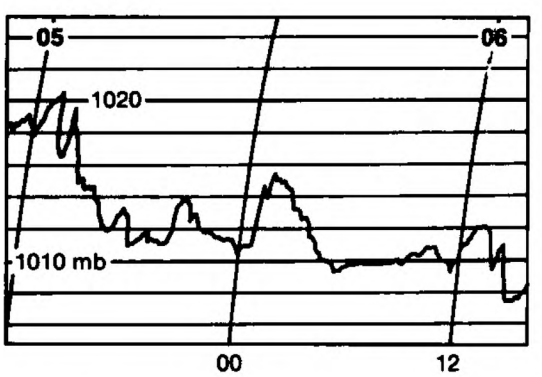
UNSTABLE WEATHER

Western South Atlantic

m.v. *Ahmad Al Fateh.* Captain M.D. Wood. At anchor, Rio Grande Do Sul. Observers: the Master, Mr F. Hassanien, Chief Officer and Mr C.G.A. Cupples, Radio Officer.

5–6 October 1986. A period of unstable weather was experienced between these dates, and the associated pressure changes are shown on the barogram.

Throughout the time of erratic pressure changes, the sky was heavily overcast



with stratus and ragged cumulus cloud. Continuous rain, varying from drizzle to torrential downpours was also experienced. The wind varied from calm to NE'ly, force 5, with occasional gusts from the north. With each steep rise in pressure, there was an electrical storm with flashes of both forked and sheet lightning. This was accompanied by very loud thunder-claps immediately after the lightning.

At 2030 GMT on the 5th an unusual phenomenon was observed. Both radar sets were in operation at the time, and on both, the pictures faded away until there were no echoes to be seen on any range. At the same time, the main engine r.p.m. indicators on the bridge went berserk; they were flickering wildly between zero and full astern. This state of affairs lasted for about ten minutes, after which the radar pictures returned, and the rev. counters settled to zero again.

The only explanation for this event is that either the atmosphere around the ship, or the ship itself became electrically charged.

Position of ship: 32° 13′S, 51° 55′W.

Note. Mr R.D. Whyman comments:

'The synoptic charts for 6 October 1986 show a thundery trough in the area. Pressure variations and gustiness of the wind as described, are typical of thundery situations.

'Captain Wood is correct in suggesting that the ship, or atmosphere around it would have become electrically charged and this is the probable explanation for the phenomenon observed with the radar and r.p.m. indicators.'

Note. The *Ahmad Al Fateh* is a Supplementary Ship of the Saudi Arabian Voluntary Observing Fleet.

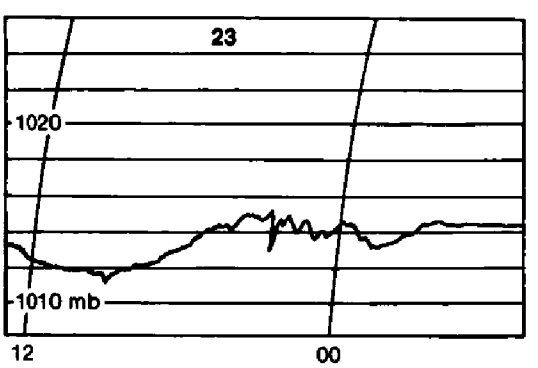
SQUALL

South Pacific Ocean

m.v. *Wellington Star*. Captain T.C. Black. Los Angeles to Pago Pago. Observers: the Master, Mr P.C. French, Chief Officer and Mr G.A. Hoe-Richardson, 3rd Officer.

23 October 1986. As the ship was approaching American Samoa from the north-east, a remarkable sequence of events took place. What began as a calm, sunny morning became a storm within minutes. This transformation is best described by the following observations.

2000 GMT:	Wind E'ly, force 3; 1 okta small cumulus, with traces of altocumulus; air temperature 29.0 °C, wet bulb 26.3.
2030:	Wind veered to SE'ly, force 3; cloud cover quickly increasing, very low cumulus observed moving at great speed.
2032:	Wind veered to SW'ly, force 10. The sky quickly became overcast, there was very heavy rain, and visibility was reduced to approximately 90 m. Six small waterspouts were sighted close to the ship within the following five minutes. Pressure fell quickly, see barogram. (It should be noted that the barograph was running approximately 40 minutes fast.)



2045: Wind backed to S'ly, force 5. Heavy rain continued, but now accompanied by lightning, although no thunder heard. Waterspouts no longer visible, pressure started rising quickly.

2110: Wind increased to force 6. Rain moderated; visibility improved to 1 n.mile; many small pressure fluctuations observed.

2140: Wind backed to SE'ly, force 6. Air temperature 24.4, wet bulb 23.5, sea 28.5.

The wind gradually moderated to force 3, and the rain cleared as the ship approached Pago Pago, arriving at the pilot station at 2330. It may be of interest to note that the waterspouts were rotating in a clockwise direction; their paths were all somewhat erratic, often stopping for a few seconds, but the general direction was north-easterly. The nearest one passed within 9 m of the ship, the most distant was about 0.5 n.mile away.

Position of ship at 2032 GMT: 13° 30'S, 169° 42'W.

WATERSPOUTS

Mediterranean Sea

s.s. *ACT 1*. Captain I.C. MacIntosh. Naples to Piraeus. Observers: the Master, Mr H. Le Cornu, 2nd Officer, Mr L. St J. Campbell, 3rd Officer, Mr M. Cryan, 3rd Engineer Officer and Mrs Cryan.

1 October 1986. Having left Naples in the early afternoon in somewhat squally conditions, the vessel encountered a number of interesting waterspouts whilst rounding the island of Capri. The sky was deeply overcast, and there was heavy rain.

The waterspouts (one of which is pictured opposite page 188), were observed forming on the starboard bow, some 1.5 n. mile distant. Each one took only a few minutes to form. They appeared to be travelling in a northerly direction, against the wind, which at the time was SE'ly, force 4, and their direction of rotation was anti-clockwise. To avoid the spouts passing over the vessel, a substantial alteration of course to port was made, and they passed down our starboard side.

The total duration was about forty minutes, but throughout this period, their intensity varied greatly. They would form strongly, then gradually dissipate before springing back to life again. From the photograph, it can be seen that the area of water disturbance was considerably large, up to approximately 5 n. mile.

At the time, the air temperature was 20.5 °C and the wet bulb was 20.0.

Position of ship at 1330 GMT: 40° 30'N, 14° 12'E.

LIGHTNING

Red Sea

m.v. *Forthbank*. Captain D. McPhail. Singapore to Port Said. Observers: Mr R. Hanraads, 2nd Officer, Mr E.P. Mullan 3rd Officer, Mr A. Sattor and Mr A. Mannam, Lookouts.

28–29 November 1986. Whilst in the Red Sea, a lightning storm lasting at least six hours was observed. The lightning varied in type from forked to sheet, and often the entire cloud formation was lit for periods of up to one second. The following observations were taken.

1800 GMT:	Wind SW'ly, force 3; pressure 1009.4 mb; air temperature 27.0 °C, wet bulb 25.6, sea 26.2.
2030:	Sky becoming cloudy with 6 oktas cumulonimbus. Severe lightning, heavy rain visible in line-squall 30 n.mile north of vessel.
2045:	Wind variable, force 1–2; pressure 1008.9 mb; air temperature 26.7, wet bulb 25.3. Severe lightning visible almost continuously from 2 oktas cumulonimbus.
2120:	Vessel passes line-squall about 4 n.mile to the east. Wind becoming NW'ly, force 2–3; pressure 1008.5 mb; air temperature 25.0, wet bulb 19.2. Lightning visible almost continuously from squall, now astern.
2200:	Wind increasing to NW'ly, force 4.
2300:	Wind NW'ly, force 5; pressure 1009.6 mb; air temperature 23.0, wet bulb 17.0, sea 26.5. Lightning still visible astern, almost continuously.

At 0200 on the 29th, lightning was still visible almost continuously, as it disappeared over the horizon astern. From the time of the first observation to the last, there was never a period of more than five seconds when lightning could not be seen.

Position of ship at 1800 GMT on the 28th: 24° 42'N, 36° 00'E.

Moçambique Channel

m.v. *Leonia*. Captain R. Firth. Ras Tanura to Galveston. Observers: Mr A.D. Broad, 3rd Officer, Mr M. Collins, Radio Officer, Mrs Collins, and ship's company.

27 November 1986. Between 1720 GMT and 2145 GMT, lightning was observed to be coming from a large band of cumulonimbus clouds about 40 n.mile away, the bearing of which was 250–300°.

There were almost continual lightning strikes to the Earth's surface, with occasional sheet lightning. Some of the strikes lasted for up to five seconds, with colours ranging from white, tinged with blue and violet, to orange; the sheet lightning gave near daylight brightness even from that distance. (See photograph opposite page 205).

By 1840, the storm clouds were within 10 n.mile of the vessel, but the lightning frequency had moderated to one flash every ten to fifteen seconds, bearing 250–360°. By 2000 this storm had nearly died out, and only the occasional strike was observed from it, but a second storm was approaching from a similar direction (230–270°), with lightning strikes occurring at about five-second intervals. It was still of the forked and sheet types, but was more hidden by the clouds, and eventually died out by 2145. Throughout the whole period, only about five very distant thunderclaps were heard.

Weather conditions at the time were: air temperature 25.3 °C, wet bulb 24.3, pressure 1008.4 mb.

Position of ship: 26° 22'S, 34° 34'E.

CURRENTS

South China Sea

s.s. *British Ranger*. Captain J.O. Bailey. At anchor off Brunei. Observers: Mr J.N. Gregson, 2nd Officer, Mr M.R. Hewitt, Radio Officer and Mr B. Merritt, CPO.

22–30 October 1986. Having been at anchor for so long, it seemed the opportune time to start a project to try to measure the sea-surface currents. Once

having decided this, the Radio Officer, in the technical department, came up with the idea of making a board to which a line could be attached. By measuring the force on the line, we could calibrate this to measure the current. The Second Officer had the more primitive, and subsequently more effective idea of measuring the line, and timing a given distance as it went out.

In the end, we combined the two. The CPO did most of the work in constructing the board. It consisted of a thin board with an area of approximately one square metre. This was made to float just on the surface by attaching a timber batten to the top edge of the board. To ensure that it would float vertically, a steel weight was bolted to the lower edge, but in such a position that it did not overlap the board. The amount of steel was adjusted to keep virtually all the board under water in order to minimise the effects of wind. The board and batten were then painted with two coats each of undercoat and topcoat. Four lengths of manilla were attached, one to each corner of the board. The lower two were made longer than the upper pair to allow for the angle of the line to the ship's stern and to enable the board to be tipped while hauling in. An old speedline of approximately 250 m was available, and was marked in 10-m intervals, then attached to the manilla 'tails'.

The first 60 m of line were not used in measuring the current, to allow the board to be well clear of the vessel. A piece of canvas was sewn to the line at this point, and was the first 'time mark'. When the board was first put in the water, it floated as expected after trials in the swimming pool. There was found to be a considerable force on the line for a relatively small current. From our experiments in the pool, it was found that the weight required to sink the floating board was very small. After five days, the board had sunk, and the speedline which had originally floated was also sinking. We attributed the sinking of the board as possibly being due to the additional weight of the sinking speedline. Unfortunately, the board was lost.

However, not to be beaten at the first hurdle caused by the parting of the line on the ship's transom, we came up with a second method of measuring the current, although rather more basic. We used an empty 5-gallon foam compound container. This was filled with sea water and a few nuts and bolts until it just floated on the surface of the water. A tail of 20-mm polypropylene rope, which floated, was attached to the plastic container by one end, and to the speedline by the other. When the speedline parted, there was little line lost.

With the container streamed, again with the weight being critical, the speedline caused the float to sink. To prevent this, a small plastic bottle was attached to the polypropylene tail where it was tied to the speedline. This appeared to solve the problem. We accept there were obvious inaccuracies with this method, such as the exact time for a given length of line to pay out. To make this as accurate as possible, we used 120 m of line, and tried to time the two marks for the same weight on the line.

Once the time had been obtained, the current was calculated by:

$$\frac{3600 \cdot l}{1852 \cdot x} = \text{current in knots}$$

where l = line streamed (m), x = streaming time for 1 (sec), 1852 = metres/n. mile

The data recorded for the first week is shown in the accompanying table.

Date Time (GMT)	Rope length (m)	Clock time (min/sec)	Time difference (min/sec)	(sec)	Curr. (kn)	Dir.	Ship's head
22nd 0700	30	1 29	1 29	89	0.65		
	60	3 00	1 31	91	0.64		
	120	6 03	3 03	183	0.64		
Observed reading	120	6 03		363	0.64	235°	
23rd 0500	30	1 59	1 51	119	0.49		
	60	4 07	2 08	128	0.45		
	90	6 18	2 11	131	0.45		
	120	8 23	2 05	125	0.47		
Observed reading	120	8 23		503	0.46	250°	
24th 0300	30	3 10	3 10	190	0.31		
	50	5 30	2 20	140	0.28		
Observed reading	50	5 30		330	0.29	182°	212°
25th 0300	10	1 43	1 43	103	0.19		
	40	7 23	5 40	340	0.17		
	50	8 53	1 30	90	0.21		
Observed reading	50	8 53		533	0.18	090°	078°
27th 0300	30	1 30	1 30	90	0.64		
	60	2 58	1 28	88	0.66		
	90	4 45	1 47	107	0.40		
Observed reading	90	4 45		285	0.61	249°	249°
1200	30	1 45	1 45	105	0.56		
	60	3 47	2 02	122	0.49		
	90	6 32	2 45	165	0.35		
	120	9 05	2 33	153	0.39		
Observed reading	120	9 05		545	0.43	227°	237°
28th 1200	60	6 10	6 10	370	0.31		
	90	9 03	2 53	173	0.33		
Observed reading	90	9 03		543	0.32	188°	258°
30th 0300	60	5 10	5 10	310	0.37		
	120	9 58	4 48	288	0.39		
Observed reading	120	9 58		598	0.39	150°	178°

Note. For each observation made now, the foam container is streamed over 120 m, excluding the first 50 m used to clear the vessel.

Position of ship: 04° 54′N, 114° 56′E.

Note. Mr J. Clark, of the Ocean Currents section, Meteorological Office, comments:

'An example of perseverance and ingenuity! There is a distinct dearth of "official" current information in the immediate vicnity of this area, but the couple of dozen or so observations available for the months of October and November, hint that the measurements made by the *British Ranger* are fairly realistic.

'However, it is likely that because of the weight of the drum and its contents, and the tension on the line, the readings were somewhat underestimated when compared with those (hypothetically) taken by conventional methods.

'The *China Sea Pilot* (No. 31, Vol. II) indicates a predominant north-east current along this coast in October and November, but wind, tide and river outflow could account for the variations in current found by the *British Ranger*, especially when considering the small area, and short period over which measurements were taken.'

CETACEA

Tasman Sea

m.v. *Forum New Zealand*. Captain T.E. Partridge. Brisbane to Port Moresby. Observer: Mr G.C. Grey, 2nd Officer.

18 October 1986. At about 1815 GMT three large dolphins were observed around the bow, behaving in the usual 'escorting' manner. One of them left shortly afterwards, but the remaining two proceeded to ride the bulbous bow for the next half-hour or so.

At first, one dolphin was immediately ahead of the bulbous bow, while the other took up a seemingly hazardous position over the bulb, close to the stem of the ship. Both of them seemed to be effortlessly allowing the ship to carry them along in the water flow past the bow; only minimal use of the fins and tail could be seen.

After a while, both dolphins took up the position over the bulb, appearing to be carried along side-by-side in the bow wave as it was lifted over the bulb by the ship's motion. Still apparently effortlessly, they maintained this method of 'hitching a ride' from the ship — so close to the bow that they were almost touching the upper surface of the bulb with their undersides. Occasionally, they would lie over on their sides, and once, briefly, one of them allowed itself to be carried along upside-down. Eventually, both dolphins sheered off to seaward, and no more were seen in the area. In the near dark of early dawn, it was unfortunately not possible to identify the dolphins positively, but they were of a larger variety, with dark grey topsides and white undersides.

I have served in a number of ships fitted with various forms of bulbous bow, but have never seen this kind of behaviour before. Ship speed seems to be a very relevant factor with bulbous bows; the only other occasion on which I have seen dolphins 'under the bow' in this type of vessel was near Bass Strait in the container ship *New Zealand Caribbean*, which at the time was steaming at a reduced speed of 13 knots (the *Forum New Zealand* was making good about 14 knots at the time of this observation and the bulbous bow was only just fully submerged). It was a truly fascinating half-hour of observation.

Position of ship: 26° 26′S, 153° 15′E.

Note. The *Forum New Zealand* is a Selected Ship of the New Zealand Voluntary Observing Fleet.

Southern Ocean

m.v. *ACT 7*. Captain D. Newlin. Rotterdam to Melbourne. Observers: Mr S.R. Pridmore, 2nd Officer and Mr P.J. Neve, 3rd Officer.

20 December 1986. At about 0300 GMT a group of four cetaceans was observed swimming north across the bow of the vessel. Initially, the whales were seen to briefly break the surface and then submerge again. With the aid of binoculars, another two sightings, each of about fifteen seconds, were made before they eventually submerged and disappeared.

All four animals seemed to be about the same size, estimated to be 7 m–8 m in length. Besides this, only three relatively distinct features were observed: a short, triangular fin set well back on the body; dark-grey colouration with a definite yellow-brown tint around the fin area; a rounded, melon-like head.

From the general size and appearance, it seemed likely that these whales were of the Ziphiidae family, but the sighting was unfortunately too short for a definite identification. We do however, note Watson's description of the Southern Fourtooth Whale, *Berardius arnuxii*, and the similarity between this and our sighting. Assuming this was a ziphid whale, it was noticeable that the head and beak were not visible during breathing, nor were the tail flukes particularly visible or raised during the dive sequence, as is common in many of this family.

Position of ship: 43° 09'S, 132° 28'E.

Note. Mr D.A. McBrearty, of the Department of Anatomy, University of Cambridge, comments:

'I would certainly agree with the reasoning. I have never observed this species at sea, or even in the flesh, a skull in a museum is all I have seen. I am pleased therefore, to have this description of events.'

Western North Pacific

m.v. *Willowbank*. Captain A. B. Osborne. Auckland to Oakland. Observer: Mr A. Stangroom, 3rd Officer.

1 October 1986. At 1800 GMT, a school of about forty dolphins was sighted about 0.5 n.mile away to port, heading away from the vessel fairly fast; six more individuals were also then noticed about 200 m from the vessel, these too were heading away. They were about 2 m long, and had a thin stripe on the lower flank, running the full length of the body, whilst their undersides were cream-coloured, tinged with pink. Their topsides were brown, they had longish beaks and curved dorsal fins. The upper flank was not uniform in its dark colouring, this was attributed to the light areas around the 'reverse dorsal fin effect' stripe. It was thought that these were Striped Dolphins. No antics were observed, and the school was in a roughly linear formation.

Five minutes later, a large school of dolphins was sighted off the starboard bow, heading away at ninety degrees from the ship at a fast pace. The ship's course was altered so as to get closer, but the dolphins still managed to maintain a safe distance; they leapt in unison whilst keeping a linear formation. There was also a trailing group of about thirty individuals. Unfortunately, all the dolphins were heading towards sun-reflecting water, making identification difficult, but they had long beaks, curved dorsal fins and slender bodies with dark topsides. Their leaps were of a medium height, and again, no antics were noted.

At 1840, another school was seen a mile or so off the starboard bow, heading away from the ship. Again, the course was altered towards them, but the ship did not get close as the dolphins were heading off at right-angles at a fast pace. Sometimes only a handful of dolphins would be in the air, whilst at others, fifty or more would breach at the same time, all fairly close together. When they did change direction, it was *en masse* so that they would all breach moving the same way. Juveniles were occasionally sighted, but exact numbers were impossible to estimate.

They had long beaks, curved dorsal fins, dark flanks and topsides, and measured about 2 m in length. It is probable that the latter two schools were also Striped Dolphins, as their general field appearance was very similar to those seen earlier.

Position of ship at 1800 GMT: 10° 52'N, 145° 46'W.

FISH

Ceram Sea

m.v. *La Pampa*. Captain K.K. Smith. Gladstone to Suez. Observer: Mr C.A. Bates, 3rd Officer.

31 October 1986. At 0057 GMT a strange fish, definitely identified as a Barracuda (Sphyraenidae) was seen to jump clear of the water approximately 40 times while chasing flying fish in a manner suggestive of hunting. The fish was very long, about 1.5 m, and thin, with a serrated fin close to its head. This fin was extended only occasionally, seemingly used by the fish to maintain its balance in the air. The fish was observed for four minutes, flitting extremely quickly across the surface in its hunt for food. Its main hunting path was alongside the ship, where it seemed to be waiting for 'bursts' of flying fish. After chasing for a while, the Barracuda came back to its station on the port bow three times. At the time, the sea temperature was 28.5° C.

Position of ship: 01° 19′S, 129° 50′E.

Note. Dr F. Evans, of the Dove Marine Laboratory, University of Newcastle upon Tyne, comments:

'Despite the "definite" identification, I think it unlikely that this was a Barracuda since the description fits much more accurately the Dorado, Coryphaena (of which there are two very similar species). If you refer to this fish in Paul Horsman's excellent book *The Seafarer's Guide to Marine Life*, the picture there is one of the book's less successful ones; the fish is in fact a beautifully-coloured silver, with a blue back, and yellow shadings beneath. The serrated fin close behind the head is diagnostic. Dorado feed voraciously on flying fish, and when not travelling "flat out" in pursuit, like to find a shady spot under drifting objects, where they lurk.'

MARINE LIFE

Arabian Sea

R.R.S. *Charles Darwin*. Captain P.H. Warne. On research passage, north-west Indian Ocean. Observer: Mr S.B. Beal, 3rd Officer.

23–24 October 1986. During the night, the vessel was surrounded by hundreds of squid which were feeding on small flying-fish.

When in the water, the squid seemed to be orange in colour, whilst occasionally turning to white; however, when removed from the sea, the squid retained the orange/brown colour for a short period. An unusual feature was that all the squid were roughly the same length, measuring about 1 m.

At the time of observation, the sea-water temperature was 27.6 ° C, and there was only a slight SE'ly swell.

Position of ship: 16° 36′N, 60° 36′E.

Note. Dr F. Evans comments:

'There is a report and drawing in *The Marine Observer*, April 1986, of an orange-coloured squid seen in the tropical Atlantic, and in my comment, I suggested the possibility that it might perhaps be *Onychoteuthis banksi*. Shortly afterwards, I received the following letter, which I have slightly amended, from Dr K.N. Nesis, of the Institute of Oceanology, Academy of Sciences, U.S.S.R.:

"In the April edition of *The Marine Observer* you commented on the observations of sea creatures made by the crew of the *Afric Star* in the central Atlantic. You stated they were squid, possibly *Onychoteuthis banksi*. You were right, they were squid, but not *O. banksi*, but *Stenoteuthis* (=Ommastrephes) *pteropus*, the Orange-back squid. The character most typical of this species

only is the vivid orange patch in the dorsal part of the mantle near the anterior end, which gives the name. This is the dorsal photophore (luminescent organ) developed only in semi-adult and adult specimens of this species and its Indo-Pacific congener (cousin).

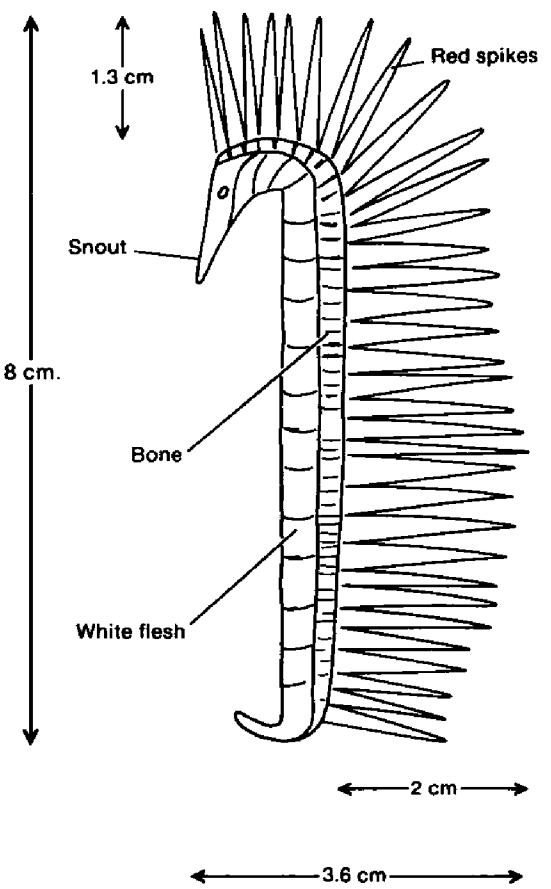
"This species is very common in the tropical Atlantic. It is very tasty, and catching these squid by jigger is a favourite hobby of seamen, at least on our ships. They rarely leap out of the water, but I have observed them leaping while attacking by a school of frigate mackerel(?)."

'It seems probable that the orange squid seen from the *Charles Darwin*, while substantially larger than the Atlantic forms, may have been the Indo-Pacific congener referred to. I have written to Dr Nesis, thanking him for identifying the Atlantic species for us all.'

South China Sea

s.s. *British Ranger*. Captain J.O. Bailey. At anchor, Brunei. Observers: Mr J.N. Gregson, 2nd Officer and Mr R. Lisle, Petty Officer.

1 November 1986. Whilst fishing from the poop, using a live bait, the Petty Officer brought the bait back on board, and the specimen shown in the sketch



was found attached to it. The 'sea-horse' appeared to be eating away at the bait where the hook went through it; its length was 8 cm, and there were about 40 red spikes running from the top of its head and down its back. Other dimensions were as shown in the sketch.

Position of ship: 04° 54'N, 114° 56' E.

Note. Dr F. Evans comments:

'The drawing and account represent no creature that ever existed, and my consultation with colleagues has produced general agreement that this was not a whole animal, but the gill of a fish that had been foul-hooked. Both drawing and description would pass fairly well as representations of the torn out gill of a fair-sized fish. If this is so, then it had simply become closely wrapped around the bait, and was not of course, feeding on it.'

BIRDS

Black Sea

m.v. *Stolt Stane*. Captain A.G. Rothery. Bosporus to Batumi, U.S.S.R. Observers: the Master, Mr D. Watkins, 2nd Officer, Mr D. Barrow, 3rd Officer, Mr R. Humby, Radio Officer and ship's company.

13–15 October 1986. During the afternoon of the 14th, a few birds landed on the ship, and throughout the night, there was a continuous arrival of birds of different types and sizes.

At about 0600 GMT on the 15th, there were approximately 350 different birds either on the ship or flying around it, and at one stage, there were 10 Tawny Owls perched on the ship's rail. They seemed fascinated by the work which was going on around them. As the day progressed, the smaller birds had started to die, and it was noticed that there were about 20 dead birds on the monkey island. These were all the same distance away from the mainmast, and it looked as though they had flown into the radar scanner at night.

The following is a list of all the birds seen: Tawny Owls, Little Owls, Short-eared Owls, Barn Owls, Robins, Linnets, Turtle Doves, Swallows, Herons, Wrynecks, Chaffinches and Carrion Crows.

At the time of the birds' arrival on the 14th, the dry bulb was 11.0 °C, the wind was NE'ly, light, there was a low NE'ly swell, and the skies were clear, but becoming heavily overcast. The previous day, there had been NE'ly winds of force 7–8, with rough seas and a heavy NE'ly swell.

Position of ship on the 14th: 41° 58′N, 32° 18′ E.

Note. Commander M.B. Casement, Chairman of the Royal Naval Birdwatching Society, comments:

'A very interesting set of records from an area seldom reported to the RNBWS. These give a good idea of the scale of migration which takes place across the Black Sea. In normal weather, it is probably unobserved by ships, but the combination of heavy overcast and NE'ly winds could have disorientated the birds, and drifted them westwards to take shelter on passing ships.'

Arabian Sea

m.v. *Cardigan Bay*. Captain P.J. Clark. Jeddah to Port Klang. Observers: the Master and ship's company.

2–5 November 1986. At 1545 GMT a small bird of prey, believed to be a Kestrel was seen for the first time, and was perching on a support under the lower platform of the signal mast. The Master found a pellet on the monkey island deck, directly below the bird, which appeared likely to have come from its crop.

The overall length of the bird, from head to tip of the long tail, was about 45 cm. It had a small, dark head with noticeable crest, a blue bill, yellow nose, pale legs and a pale cream throat. There was distinct brown mottling on the dark orange to fawn breast, this latter colour becoming creamy lower down the body. The bird's back and wings were light-brown with distinctive dark banding.

The bird remained with the ship for 3½ days, and usually perched during the day in the vicinity of the signal mast, though it was seen flying near the foremast during daylight hours after the ship had passed some 60 n.mile south of Minicoy, when some small land birds were seen for'ard. Most of its flying apparently took

place during the night, and it was occasionally seen to be flying around in the glow caused by the mainmast light.

On the afternoon of the 4th, the ship passed 13 n.mile off Sri Lanka. The bird was seen perched later that afternoon, and also flying around after dark, but was not seen the next morning. Presumably it flew off during the night when other ships were in the vicinity. The wind was W'ly, force 4–5, and the weather was generally fine and clear, but was becoming overcast as the ship approached Sri Lanka, with light to moderate rain during the evening and night of 4/5 November.

Position of ship on 2 November: 09° 44'N, 64° 55'E.

Note. Commander M.B. Casement comments:

'I sent both this report and the pellet from the bird to Mr R. Porter (the internationally recognised expert on "raptors"), of the Royal Society for the Protection of Birds. He is pretty sure that the bird is a Lesser Kestrel *Falco naumanni* juvenile (male or female). He based this on the description given, and also the analysis of the pellet which comprised largely insect remains. This species, together with its close relation the European Kestrel *Falco tinnunculus* which is well known as the common breeding species in this country, is regularly reported by ships crossing the Mediterranean and also the Red Sea.'

Indian Ocean

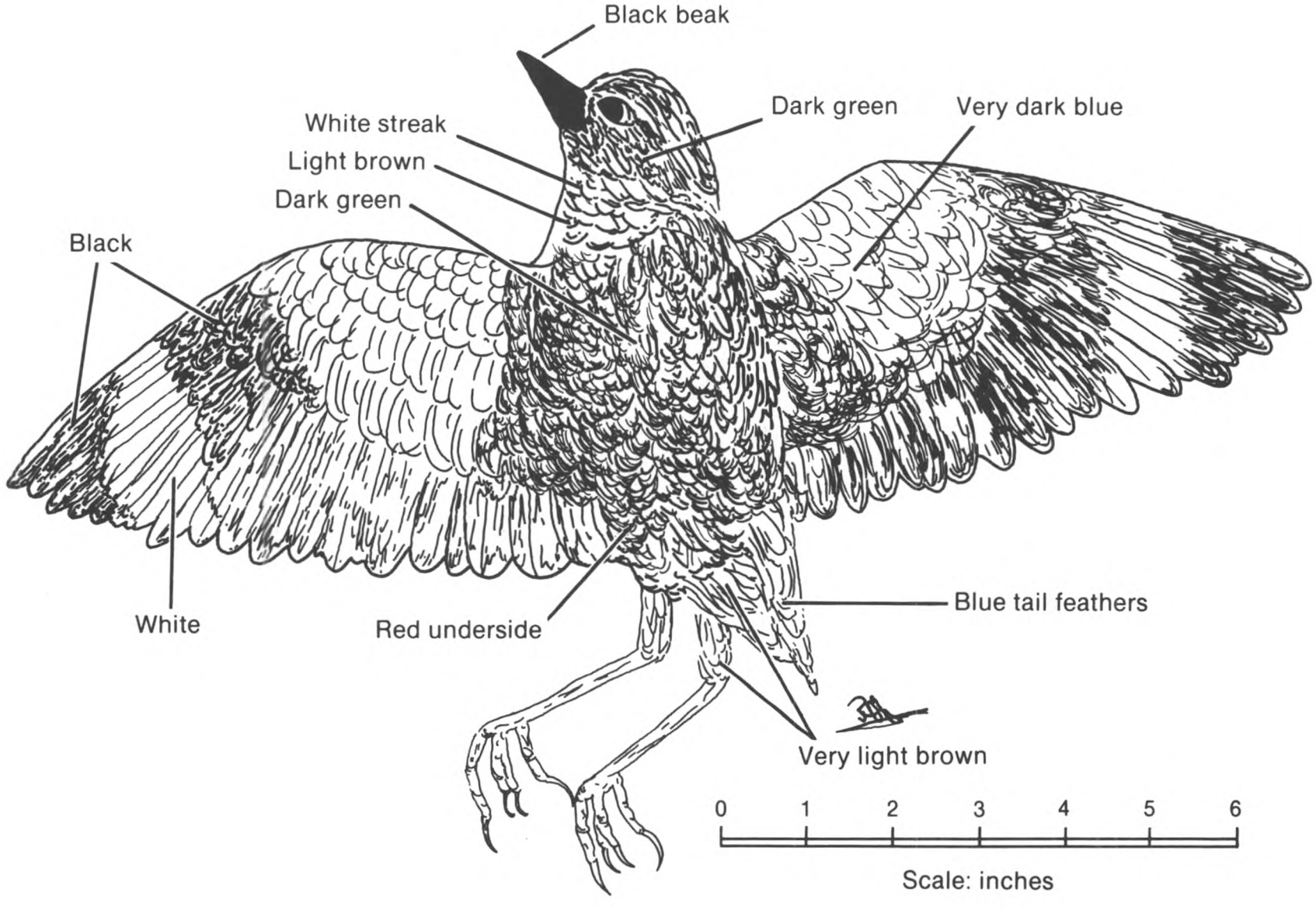
m.v. *Encounter Bay*. Captain T.L. Watson. Fremantle to Jeddah. Observers: the Master, Mr P.M. Dolphin and ship's company.

23 October 1986. At 0200 GMT a bird, see photograph opposite page 188, was spotted on a deck below the bridge; on closer inspection it was found to be a Bo'sun Bird. It was wet through, and had what could only be described as a tide mark halfway up its body, as if it had been floating in oil. It looked as if it was very close to dying, and when offered fish and water, both were refused. At this time, all its body feathers had a pink tinge to them.

The Radio Officer put on a pair of leather gauntlets and picked the bird up (at which point it showed it was far from dead), and placed it in a newspaper-lined box. This box was taken to the bridge and left in the shade. Once the bird had calmed down, it enjoyed having the top of its head stroked with a strip of paper. Throughout the day, it refused further food and water. During the afternoon, a container was filled with water so that an attempt could be made to clean the bird, but immediately it was placed in the water, it was made quite clear that this was not a good idea, so the bird was put back into the box.

By the following morning, everyone was expecting to find the bird dead, but instead, by this time, it was very much better. The body feathers which had been pink were now white and dry. Throughout the morning, the bird was trying to climb out of the box by levering itself over the side using its beak and wings. At this point, someone mentioned we should try and force-feed the bird, so once again, the Radio Officer donned the leather gauntlets and forced strips of squid down the bird's throat, and using the barrel of a syringe, he gave it some water. By lunchtime, it had eaten a large quantity of squid and was becoming very lively. The bird was released during that afternoon, it circled the vessel and headed in the direction of Diego Garcia, some 200 n.mile away.

Position of ship: 14° 54' S, 86° 37'E.


Black beak
White streak
Light brown
Dark green
Dark green
Very dark blue
Black
White
Red underside
Blue tail feathers
Very light brown
0 1 2 3 4 5 6
Scale: inches

Strait of Malacca

m.v. *Osaka Bay*. Captain J.D. Thomson. Port Klang to Jeddah. Observers: Mr R.J. Baldock, 2nd Officer and ship's company.

7 October 1986. At 0030 GMT a dead bird was found on the deck. A sketch was made, shown on the facing page, and the bird's colouring was as shown on it. At the time, the ship was at the northern end of the Strait of Malacca.

Position of ship: 05° 30′N, 97° 30′E.

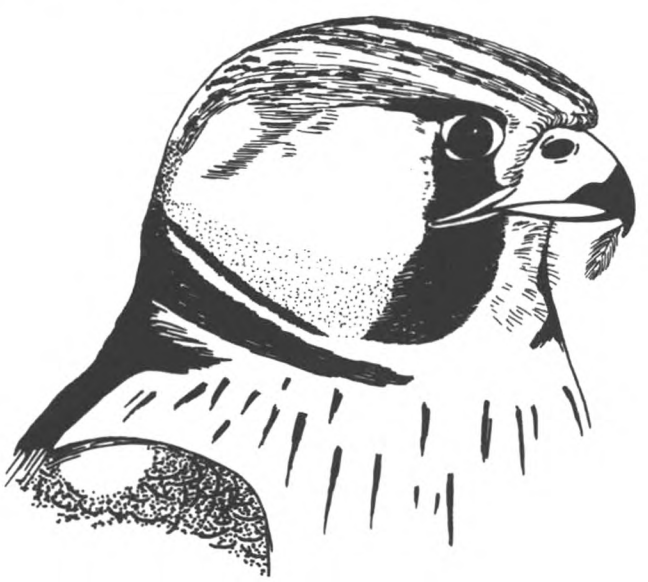
Note. Commander M.B. Casement comments:

'I suggest that this was a Blue-winged Pitton (*Pitton moluccensis*) whose range extends from India to south-west China and the Philippines. It is a spectacular-looking bird, which has, on several occasions, been recorded by ships in the Indian Ocean.'

North Pacific Ocean

m.v. *Pacific Teal*. Captain M.L. Miller. Balboa to Karatsu. Observers: the Master, Mr R.I. Cuthbert, 3rd Officer, Mr P.G. Golson, Radio Officer and ship's company.

2–5 November 1986. At 0150 GMT a falcon was sighted flying around the ship, and landed to rest, appearing tired. Its body length measured approximately 35 cm, while the wing-span was about 76 cm; a sketch was made of the head, which shows long cheek patches and a substantial beak. Wherever it came from, the bird must have had a long, hard flight, as the wind was NE'ly, force 6 at the time of first observation.



Later in the day, it was seen on top of the deck crane feeding upon a storm-petrel (possibly an Ashy Storm-petrel or a Madeiran Storm-petrel). Twice in the day, during mid-morning and the early evening, a second bird was seen. This bird, though similar to the first one, was slightly larger, a darker overall shade, and with a more speckled throat and belly. It did not alight on the ship, but circled it a few times, occasionally chasing a previously unnoticed small seabird (storm-petrel?) before flying off to the north (in the morning), and then to the

south (in the evening). Our resident falcon seemed unperturbed by the newcomer, though it did appear to watch it carefully.

The next day, while studying the falcon, we confirmed that it was preying on Madeiran Storm-petrels which must have been fairly abundant, although none had been sighted free of the falcon's clutches. It was also noticed that our bird had got its 'sea legs' as it appeared quite at home perched beneath the Satcom dome, rolling with the ship. It took up nightly residence on the platform beneath the dome, but it was not particular where it perched during the day.

In general, the falcon's appearance, state of feathers and general health all seemed to be much better than upon its initial arrival, when it did look a shade bedraggled. After a couple of days on board it looked fit and well preened, as it should after at least three meals a day.

There was no sign of the bird on the morning of the 5th, although it was not unusual for it to be away from the ship hunting at this time. When it failed to return by lunchtime, it was assumed that it had either joined another vessel or headed towards the Hawaiian Islands approximately 220 n.mile west-south-west.

Position of ship at 0150 GMT on the 2nd: 19° 29′N, 130° 21′W.

Note. Commander M.B. Casement comments:

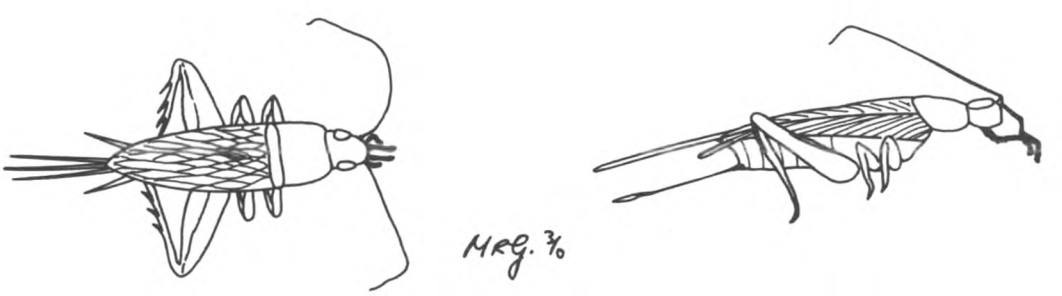
'The nice sketch confirms that this was a Peregrine Falcon (*Falco Peregrinus*).'

INSECTS

Equatorial Atlantic

m.v. *Graiglas*. Captain R. Wade. Gijon to Tubarao. Observers: Mr C.M. Berkeley, Extra Chief Officer and Mr M.R. Gover, 3rd Officer.

23 November 1986. At about 0800 GMT a cricket, see sketch, was caught on the bridge after a quick chase, and secured with a swift 'zap' of flyspray. This insect had been heard chirruping away for the previous two days, and it was assumed to have arrived on board with the prevailing NE'ly wind, when the ship passed through the Cape Verde Islands, and the region to the south.



The specimen was captured by the nimble efforts of the Extra Chief Officer, and the 'Beastie Particulars' follow. It was black in colour overall, except for a white band across the base of the wing covers, and a white spot on the top front of the head, whilst the bases of the largest pair of legs were red. The body was 40 mm long, 8 mm wide, and had antennae of 30 mm in length. Its mandibles were 6 mm long, the main leg measured 27 mm, and the forelegs 12 mm.

Position of ship at 0600 GMT: 03° 48′N, 29° 36′W.

Note. Mrs J. Marshall, of the Department of Entomology, British Museum (Natural History), comments:

'From the description and drawings, the species is clearly the Black Field-cricket, *Gryllus bimaculatus* De Geer, although the specimen illustrated is an adult female, with the long, thin ovipositor; only the adult males actually sing.'

BIOLUMINESCENCE

Equatorial Atlantic

m.v. *Graiglas*. Captain J.A. Coffin. Tubarao to Gijon. Observers: Mr M.R. Gover, 3rd Officer and Mr C. Pinto, AB.

30 October 1986. Between 2130 GMT and 2300 GMT, the ship was treated to a spectacle of what seemed like underwater fireworks.

There was some slight bioluminescence along the ship's side, very close to the hull, but by and large, the majority of activity occurred in the ship's wake, and close to the ship's stern on either side.

Neither radar nor echo-sounder were switched on at the time, and so they were flashed up in order to see what effect they had — nothing was noted. The Aldis lamp was flashed into the water to see what happened, this had no effect either.

The activity consisted of very fast and rapid flashes of pale white/blue and white/green, of 1.5–2 seconds' duration. The majority of the flashes started off as a glow which was about 0.5 m wide, and which then grew in intensity and size to about 1 m wide before fading away. At any one time there must have been at least 100 of these flashes, and this occurred nearly continuously for the entire period noted above.

Occasionally, a very fast, bright white light would appear then disappear in about half a second, leaving hardly any after-glow at all. This light was of the same magnitude as Jupiter, and covered a small area of perhaps 10 cm if not less.

At the time, the air temperature was 26.0 °C, wet bulb 25.3 and sea temperature 26.5. Ship speed was 11.7 knots at 83.3 r.p.m.

Position of ship: 01° 15′N, 29° 42′W.

Note. Dr P.J. Herring, of the Institute of Oceanographic Sciences, Wormley, comments:

'This must have been a very spectacular sight. Comb-jellies (among the brightest of luminous animals) produce a rapidly-flickering luminescence. These may have been responsible, but are generally only a few centimetres in diameter, so to give the observed effect they must have been well below the surface. Some lanternfish and some squid also produce very bright, short, but sometimes repeated light flashes too, and could have been responsible, but I tend to favour the jellies as the most likely source.'

METEOR

Caribbean Sea

m.v. *G.A. Walker*. Captain E.C. Metham. Topolobampo (Mexico) to Tampico. Observer: Miss E.E. Nelson, 3rd Officer.

1 November 1986. At 0310 GMT a meteor was seen to fall vertically, following a straight path from position SHA 311° declination 44° N, and burning for about three seconds before disappearing behind cloud at SHA 275° declination 42°

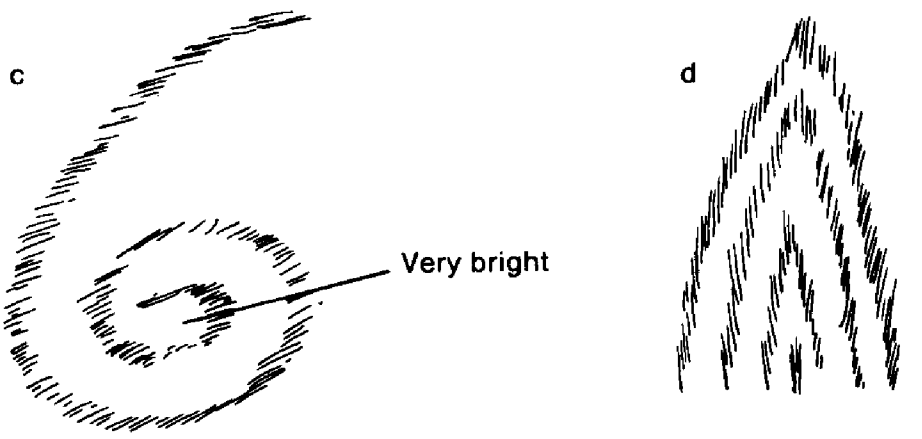
Opposite page 189

Photograph by courtesy of P. & O. Group Information

P. & O. liner *Pacific Princess* off Greenwich on 7 July 1987 to celebrate the company's 150th anniversary. (See page 166.)

30th 2031: Clouds on the horizon, but moonless sky otherwise bright and clear. Aurora formed as in sketch (b). Light within the band could be seen moving like low clouds or smoke.

2105: At different positions in the sky, spiral-like formations were observed as in sketch (c).
2205: The most intense light was observed forming shapes as in sketch (c), and also 'flames',



see sketch (d). The edges of the flames were very intense, and showed red in colour. There was very fast motion of light within the flames.

The aurora was visible until 2300, all the while changing shapes, positions and intensities, it was then hidden behind clouds.

Position of ship at 1920 GMT on the 29th: 74° 41'N, 10° 36'E.

Phenomena on the sea surface, as studied from visual observations

By F.N. Fedorov and A.I. Ginzburg

The Panama–Galapagos region (Figure 1, II and Figure 2) abounds in frontal-type phenomena and surface manifestation of internal waves of lengths $\lambda \simeq 0.2$–1 kilometres (all) due to a complicated system of currents in this region, and to sea-bed relief features (islands, shoals). The internal waves observed to the west of the Galapagos Islands (Figure 1, $\simeq 103°$ W; Figure 2 $\simeq 94°$ 30′W) with wave lengths of a few kilometres are mainly due to the Cromwell current, whose upper edge (boundary) in this region is not more than 15–20 metres down, and is characterized by large velocity shift [2].

The fronts in the Caribbean are due to drainage (outflow) from the Magdalena river, interaction of the Caribbean counter-current with the Southern Equatorial current, and the upwelling in the region $\simeq 72°$ W. The frontal zone of upwelling here is distinguished, according to TMO data, by its great variability (fluctuation). Close to the outflow front of the River Magdalena, internal waves of length $\lambda \simeq 2.3$ kilometres were observed [7].

Frontal phenomena and surface manifestation of internal waves were often noted, both close to the region where the Amazon outflow is propagated (III), and in the adjacent region a few hundred (nautical) miles from the mainland to the north-east, over the Demerara eminence (Figure 1, III). Somewhat to the north (Figure 3), in the region of (around) the boundary between the Inter-trade counter-current and the Northern trade current, measurements were taken of internal waves of wave lengths from a few hundred metres to 3 kilometres, during the twenty-third voyage of the *Academician Vernadskiy* research ship from which it was possible to establish their connection with tidal currents.

The west African region (IV) close to 10° N (Figure 1) is remarkably saturated with surface manifestations of internal waves and of suloys. The position of the observation points here is, on the average, very similar to the mean-monthly position of the recorded points of surges and suloys in this region on the map made by Remer (cf. [17] and Figure 3.27 in [8]). In both cases, the observation points were (are) concentrated in shelf-to-slope transition regions; hence, the assumption stated in [8] that the phenomena observed are due to convergence in upwelling circulation on the shelf fault, is highly probable. It is also of interest that the frequency of occurrence of surges and suloys in this region, and a little to the south, is due to seasonal variation in the intensity (rate) of upwelling (the maximum being in October [8, 17]). A similar relation connecting frequency of observation of suloy with season in the region to the west of the coast of Africa (near the Cape Verde Islands) (Figure 1) is clearly in evidence on Schumacher's maps [20] (cf. also Figure 1.1 in [8]) and is apparently due to seasonal fluctuation in current direction and strength in this region.

The Andaman Sea (Figure 1, VI and Figure 4) is yet another region of regular detection of wakes (traces) of internal waves on the sea surface, with wave lengths from a few hundred metres to 15 kilometres. A magnificent photograph of solitons of internal waves in this region was obtained from space during the Soviet-American 'Soyuz-Apollo' experiment [15] (the position of the sector of

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Part 2. Part 1 of this article appeared in the July 1987 edition of this journal.

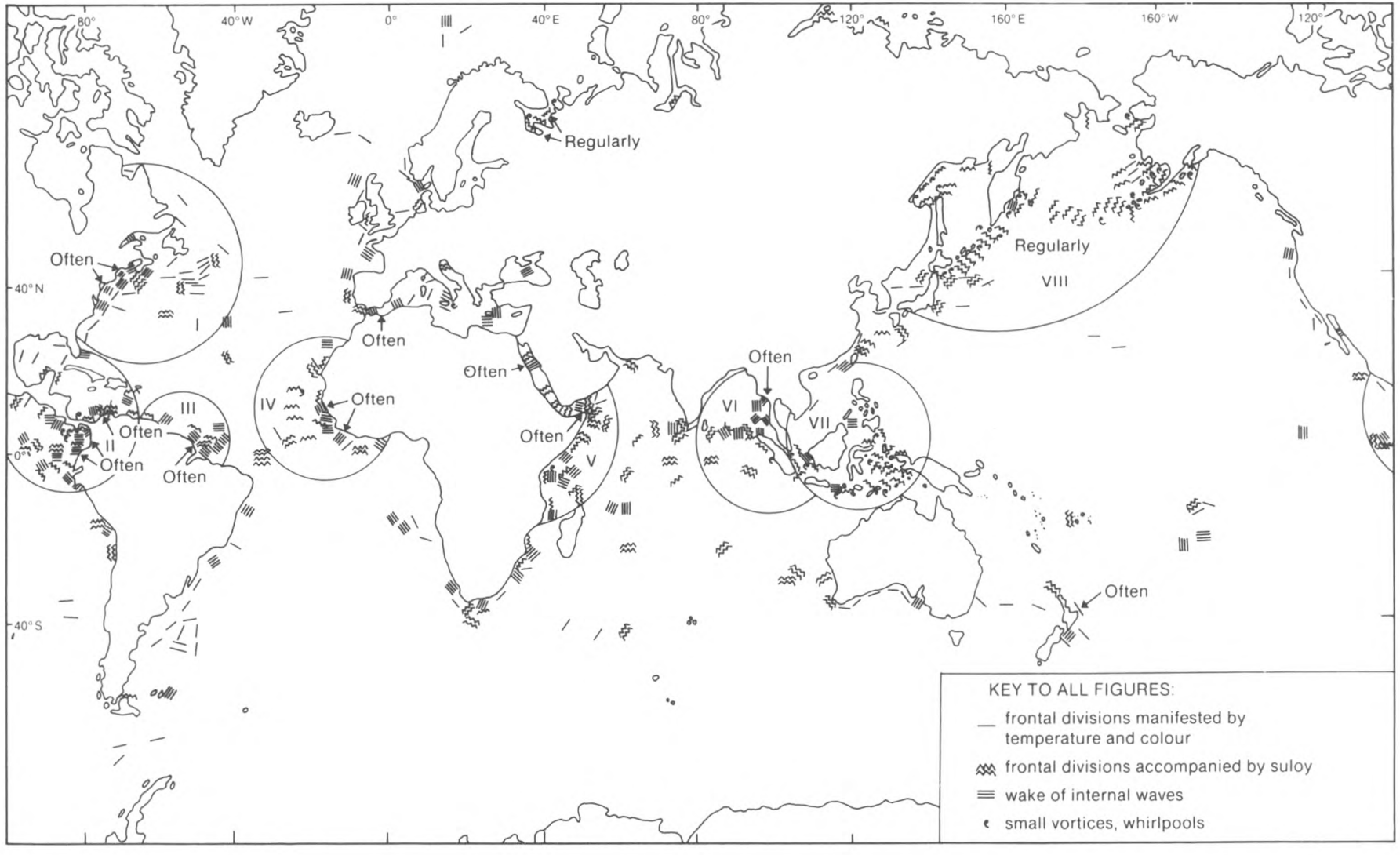

Figure 1. Phenomena on sea surface, from TMO data, pilot books, papers [1, 2, 4, 6, 9, 14, 16, 20] and from remote observations.

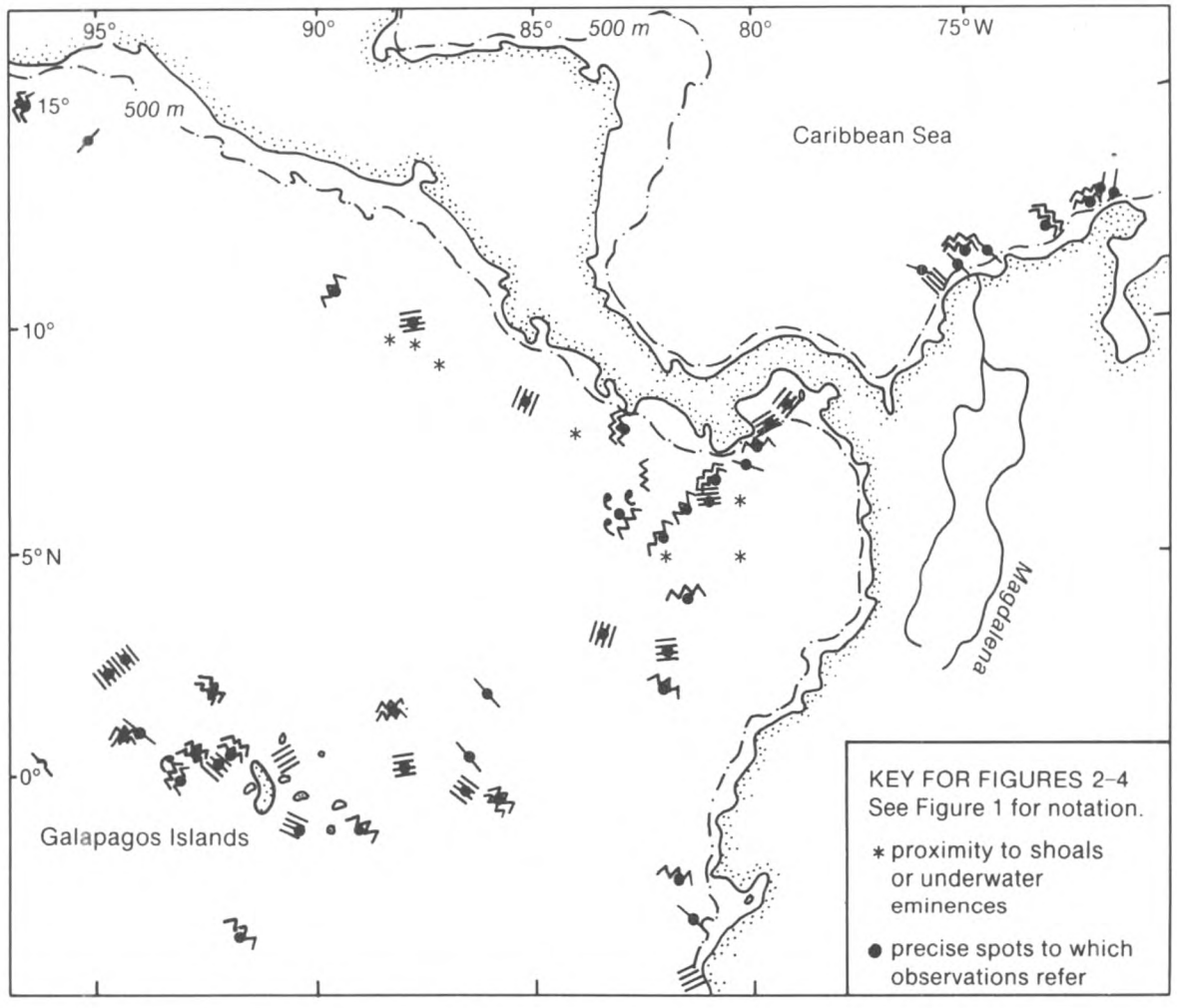

Figure 2. Panama–Galapagos and Caribbean regions.

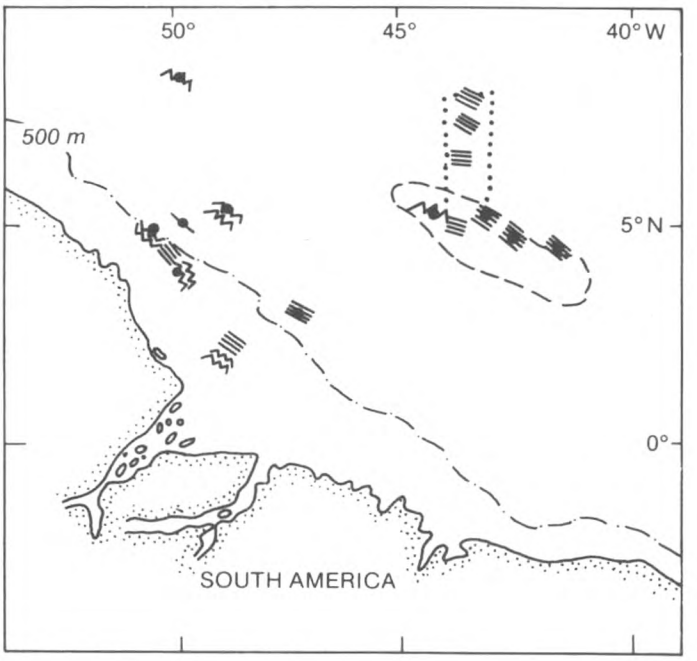

Figure 3. Region of influence of the River Amazon.
KEY: position of the Demerara eminence.
region where the *Academician*
Vernadskiy operated [6].

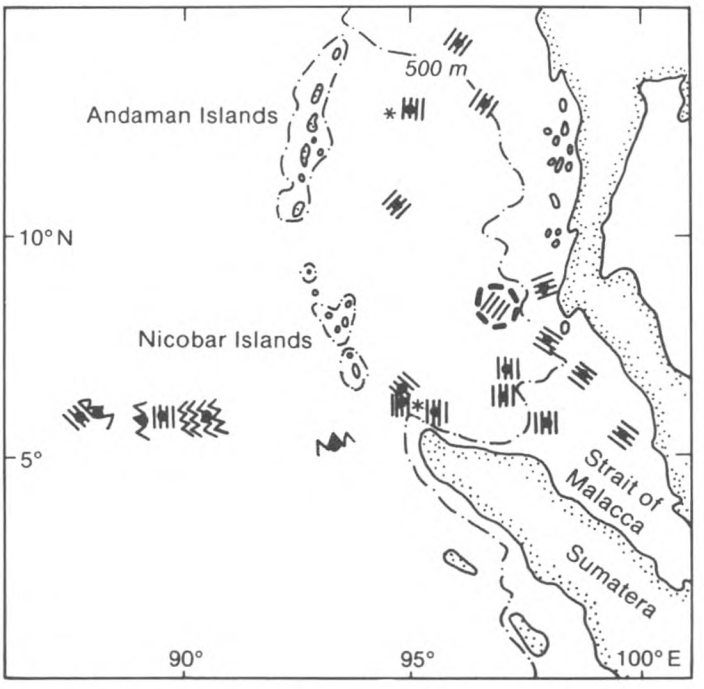

Figure 4. Region of Andaman Sea and Bengal Strait. Dashes show where internal wave solitons were photographed during the 'Soyuz–Apollo' Soviet–American experiment.

the photo being shown in Figure 4). As instrument measurements in the Andaman Sea have shown, isolated internal waves here are propagated in packets of 5–6 crests every 12 hours 26 minutes (most noticeable in syzygy) and due to destruction of a tidal wave in the shallows surrounding the sea. The authors of [15] think the most likely regions of their formation are vast banks (shoals) and underwater ridges to the north of the island of Sumatera, and around the Nicobar Islands. The Andaman Islands also possibly perform the same function for the northern region. The commentators in TMO consider the reason for manifestations on the surface, of internal waves, fronts, and suloys in the southern part of the Bengal Strait to be the meeting of the current coming from the Strait of Malacca with the Equatorial counter-current. LaFond testifies in TMO (1967, **215**) to large internal waves in the southern part of the Bengal Strait not always being met with, in contrast to the northern part, and the Andaman Sea, these being an ideal place for studying them. Large soliton-type internal waves were recently detected (observed) in the Sulu Sea from a satellite and also from a ship [12].

Though the sighting of internal waves on the sea surface is most often due to modulation in the surface wind agitation in alternating bands, it may also be due to modulation in the thickness of the upper freshened and clouded layer in the river-water outflow regions [7]. Internal wave effects are often manifested in efflorescent plankton build-up (in convergence regions) (e.g., in the Skaggerak, (and) in the Brazil current region). Sometimes, bands of modulated agitation (turbulence) can be seen at night because of bioluminescence (phosphorescence), e.g., in the Gulf of Aden. In some of the observations made by sailors, changes are noted in water temperature on sectors where internal waves are recorded, but without 'attaching' (linking) the temperature changes to the manner of crossing (over) of the bands. The first specific measurements of this kind, done on the thirty-fourth voyage of the *Academician Kurchatov* [2], showed that in slick bands, the sea temperature close to the surface is a few tenths of a degree higher (0.3–0.6 °C) than in the ripple bands. Flying fish, dolphins and kites are met with in abundance in the slick bands.

The observation analyzed give us an idea of the conditions in which the internal waves are manifested on the surface. These manifestations are most often observed (Figures 1–4) close to fronts, in places where the sea bed is uneven, close to islands and banks, in straits (channels), in drainage lenses and around, above the shelf and on its edge, in places where strong currents interact and undergo shift instability, and where distinctive inclined pycnoclines are close to the sea surface. In most of the cases just listed, we can assume that tides play an important role in the generation of the internal waves, whose wakes are (were) observed on the sea surface. The tidal waves and currents could interact with constant currents and inclined fronts or become deformed as a result of the influence of sea-bed relief, shallow water sectors, and coastal configuration. Precisely what the difference made by the tides is, has so far been demonstrated only in some (few) individual cases. Such cases include e.g., internal waves above (over) the Atlantic shelf of North America [11, 19] or (and) solitons in the Andaman Sea [15] and Tyrrhenian Sea [10]. In the latter two cases, the regions where tides generate internal waves are remote from the places where the wakes are recorded on the sea surface. In a number of cases, a connection was noted between the rate at which internal waves showed up on the sea surface, and the scale (magnitude) of the tide. For example, internal waves over (above) the

Mascarene Ridge were clearly observed visually for several days after the syzygy tide, and were virtually absent from (in) the neap tide (in) [1]. The most notable manifestations on the surface of the Andaman Sea, from internal wave solitons, is also confined to the syzygy [15].

In coastal waters (zones) the tidal currents often cause suloys to appear. Suloys form regularly and most rapidly in the White Sea and in the sectors of the Sea of Okhotsk, Bering Sea, Sunda Archipelago seas (Figure 1, VII and VIII).

Our analysis of several maritime regions [regions of the world's seas] (as above) showed that suloys form and manifest themselves externally in a wide variety of ways. They often form where the sea bed is uneven (over shoals, reefs, and sand banks), near capes (promontories), in channels, where a river outflow is interacting with a tidal current (as, for example, at the esturaries of the rivers Ponoy and Mezen in the White Sea, and of the Lena into the Lapt'yev Sea), and where different branches of tidal currents join (meet) e.g., the boundary between the coastal and monsoon currents to the south of Cape Guardafui, this can be discerned from the line of suloys and breakers (bow waves). Suloys are often to be observed in various parts of channels, depending on the direction of the tidal current (ebb or flow), e.g., in the Unalga Pass in the Bering Sea. But during syzygy tides, the suloys most frequently cover (embrace) the entire length of the channel (strait). On the other hand, suloys were not observed at all in the quadrature where there were weak tidal currents.

The effect of wind on the formation of a suloy is ambivalent. In some cases, suloys either arise (originate) during wind blowing against the tidal flow (e.g., in the Akun Strait in the Bering Sea) or else attain here their greatest intensity (in the straits between the islands to the north of Sumatera, or, as in the case of the Maelström, at (near) the Lofoten Islands). But suloys often originate during a complete calm and when there is a weak wind blowing (at the Shantar Islands and at Jona Island in the Sea of Okhotsk; at Urup Island on the Great Kuril Ridge; in the Unang Strait in the Bering Sea, where the suloys are dangerous for small ships even during calm and when there is no turbulence). In this case, the wind causes only a surge.

Suloys are quite often accompanied by whirlpools and smooth patches (e.g., in the north-east strait of the Shantar Islands). Whirlpools with a smooth water surface followed by bands of breakers are often observed near the northern littoral of Sumatera, where silt is brought from the sea bed to the surface, so forming sharply-contrasted patches of muddy water.

Smooth patches, irregular in shape, and surrounded by zones of relatively high turbulence against a background of relatively calm sea, are met with out at sea over deep water. One such patch, about 270 metres in diameter, was observed in the East China Sea (about 30° N), to the west of a chain of islands and shoals (TMO 1966, **214**), shown in Figure 1 as a suloy. A large, smooth patch, about 3.6 kilometres in diameter, surrounded by waves about 1 metre high, which collapsed towards the centre of the patch, was observed to the north of Sumatera, close to where internal waves were recorded (registered). The cause of its formation has not been established, but there is no confirmation for the theory that the patch is due to a shoal (06° 15'N, 95° 00'E, 100 metres down against a background of surrounding depths of 1500 metres) and to the destruction of internal waves close to it.

In the bands and patches where there is smooth water due to suloys, internal waves, and fronts, small vortices and ripples are quite often observed, the latter

propagated counter to the background with turbulence beyond the band or patch; close to these bands and patches, where a ship is often drawn several degrees off course, variation in wind strength and direction is sometimes observable. For example, such a band about 270 metres wide, stretching from one horizon to the other, was observed at the northern extremity of the Gulf Stream (41° 24'N, 64° 33'W). The wind speed increased from force 4 to force 6 on approaching it, over the patch, it fell to zero, and afterwards, it increased again to force 6, before dropping again to force 4 (TMO 1961, **193**).

The information set out above gives some idea both of the regions where fronts, suloys, and internal waves (Figures 1–4) are most often manifested on the sea surface, and of the kind of variety which these manifestations display. Though Figure 1 is certainly not exhaustively complete and conclusive, the development of present-day research into phenomena on the sea surface requires, in our view, that the experts should familiarize themselves with the data given by it. Completion of a detailed map can be based both on archive data and on new real-life (up-to-the-minute) data, including satellite data. We shall continue our work on this.

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'Sabean Odours'

By M. Hatch
(Meteorological Office, o.w.s. *Cumulus*)

As when to them who sail
Beyond the Cape of Hope and now are past
Mozambic, off at sea north-east winds blow
Sabean odours from spicy shore
Of Araby the blest, with such delay
Well pleased they slack their course and many a league
Cheer'd with the grateful smell old ocean smiles.

From *Paradise Lost*
By John Milton

In the classical writings of Aristotle, the Old Testament (Proverbs) and many other such works, weather lore abounds and one of the most weather conscious sections of the community is the mariner. This article is an attempt to make a detailed study of one such nautical quotation, in order to test its accuracy and trace its origin.

The above quotation from *Paradise Lost* was chosen because the author had spent four years in the region referred to; unfortunately, despite assistance from the National Meteorological Archives, the search for synoptic data for the area only served to highlight their scarcity thus rendering any interpretation a purely empirical one.

Evocative phrases such as those penned by Milton conjure up visions of exotic regions and raise the question 'from whence came his knowledge?'. This major English poet had travelled on the continent as far as Italy, was a biblical and a classical scholar of repute, perhaps a listener to mariners' and merchants' tales; or it could have been that his post as Cromwell's secretary gave him access to the logbooks of the ships of the Interregnum, but from some written or verbal source he must have obtained knowledge of the winter wind structure of the Arabian Sea. Accepting the truth behind the quotation, I have attempted a form of equation where the combined answers to the following questions will hopefully verify it. These questions include a deeper insight as to where Milton gained his information about Sabeans. What were the scents? where did they originate? and, of paramount importance within the context of this article, what were the meteorological factors which contributed to the growth of the scents and how they got to sea?

Historical background

The historical conclusions which I came to, were that Milton obtained his knowledge from the dissemination of Portuguese trading information after the decline of that country's influence in the area. The Sabeans were the cultivators and land distributors of the ancient spice trade and the scents were those of frankincense and myrrh, which were cultivated in what is now the Dhaufor province of Oman. Portuguese supremacy in the Indian Ocean dates from 1509 (Figure 1) when it was established as a result of the battle of Diu, until 1619 when the Dutch, using the Sunda Strait, established a fortified base at Batavia,

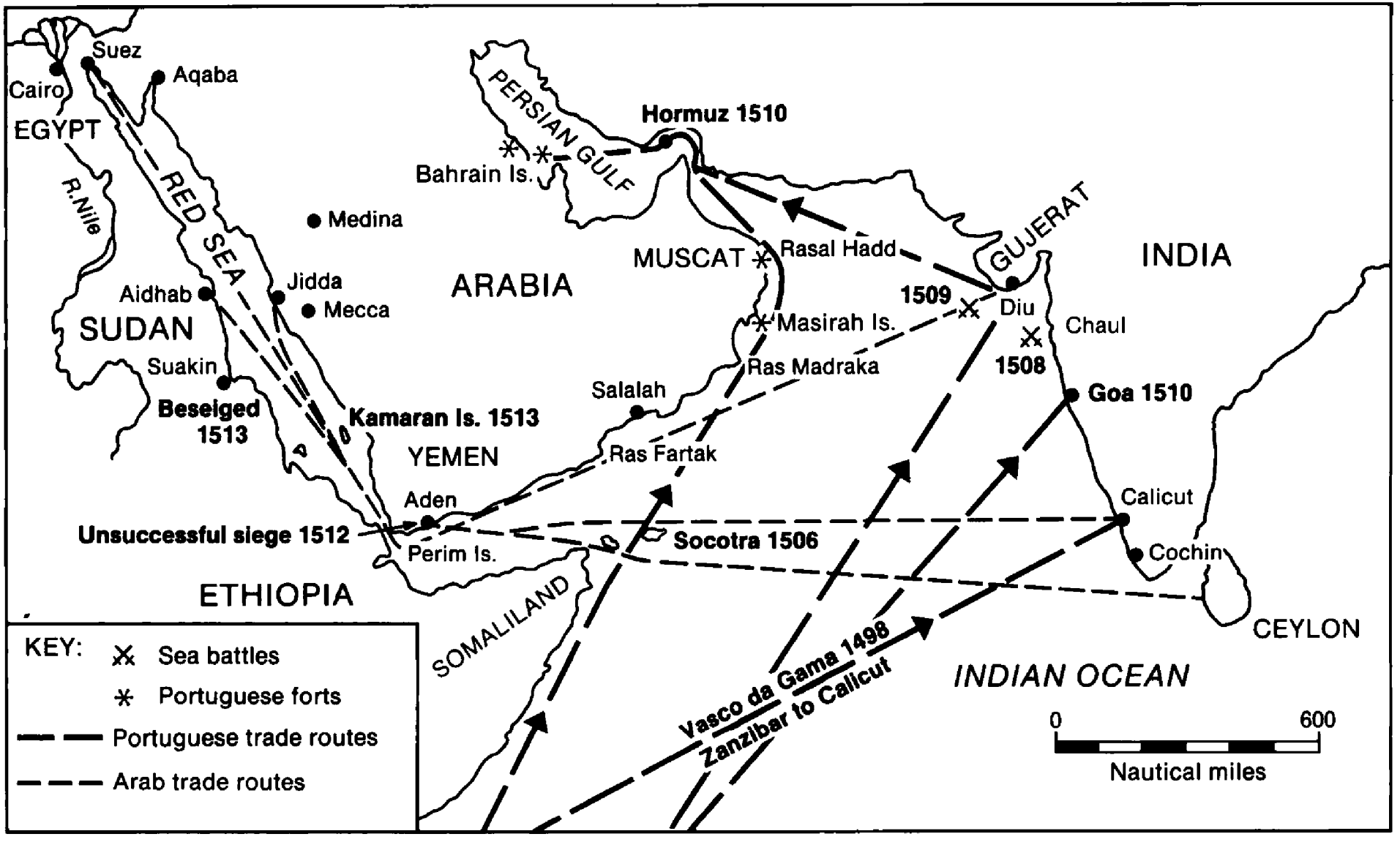

Figure 1. The Portuguese Navigators in the Indian Ocean

eastward of the Portuguese colonies of Goa and Malacca. The new Dutch route and the capture of Hormuz in 1623 by Shah Abbas led to a decline in the Portuguese influence, when the Persian Gulf, Red Sea and east African ports became commercial backwaters (1). The period between 1623 and Milton's writing of *Paradise Lost* (1658–1663) would have been long enough for the by-now umimportant secrets of the Portuguese sailing masters to become common knowledge throughout the western world.

Between the eleventh century B.C. and the first century A.D. the Sabeans referred to in biblical and Koranic sources, with their main capital at Marib (in what is now the Yemen Arab Republic), thrived on their involvement in the incense trade; Marib is situated on the main caravan route from Arabia to the Mediterranean via Medina and Petra, and a colony was established at the ancient port of Sumhuran or Samhar, indentified by both Jeapes and Nicolle as a centre of the Sabean frankincense trade. The family tree of Noah (Gen. 10:22–29) associates this area with the Hadorim who occupied it; verse 30 continues: "... and their dwelling was from Mesha, as thou goest unto Sephar, a mount of the east". Sephar is indentified from Condor's map of the ancient world as Jebel Samham near the modern town of Taqah at the mouth of Wadi Darbat, on which stood Sumhuran. By the first century B.C. the Romans had discovered the monsoon route to India, and Greek and Roman ships were soon able to carry vast quantities of Indian exports and pick up frankincense and myrrh on the way. The monopoly had been broken, although neither the Roman authorities nor the south Arabian traders approved of this development, which Pliny (who Milton may have studied) records as having adversely affected the empire's balance of payments by an annual deficit of one hundred million sesterces (2).

To conclude this section on the historical background, the point is raised that 300 years ago, the remains of the Sabean cultivation would have been much more extensive than at present, and the scents extremely pungent to those who had been at sea for months in the unhygienic ships of the day.

Meteorological Synopsis

The questions posed in the meteorological context are as follows. What caused the suitability of the area for cultivation — sufficient rain during the growth period? And what was the wind structure necessary to dry the vegetation, winnow it and carry the aromatic pollen out to sea?

The capital of the Dhaufor region is Salalah, approximately 18 kilometres south-west of Taqah, with an observing station situated on the coastal plain 5 kilometres from the capital (Salalah, position 17° 03′N, 54° 06′E), and for convenience this position is assumed to be a point source for the odours.

That the region named above is fertile is confirmed by the fact that in more recent times, during World War I, it was used as a supply area for the Mesopotamia campaign of 1918.

South-west Arabia between 15.5°N and 18°N consists of a narrow coastal strip backed by a mountain ridge running parallel to the coast, the foot-hills being 10 kilometres or less inland, the steep eastern escarpment disrupted in places by wadies (the range of mountains being the Hadramaut), ending to the north-east in the Jebel Quarra behind Salalah and Jebel Samham approximately 20 kilometres to the north-east. Behind the steep coastal escarpment lies a plateau sloping west for 250 kilometres in the south, 80 kilometres in the north, and traversed by wadies running towards Rub al Khali or Empty Quarter.

Pedgley has given an explanation of the strong northerlies which affect Salalah at times (Figure 2) and this is referred to in support of the offshore flow which can be expected, especially at night, occurring most frequently during December and January. Extremes of heating over the Empty Quarter caused by alternate

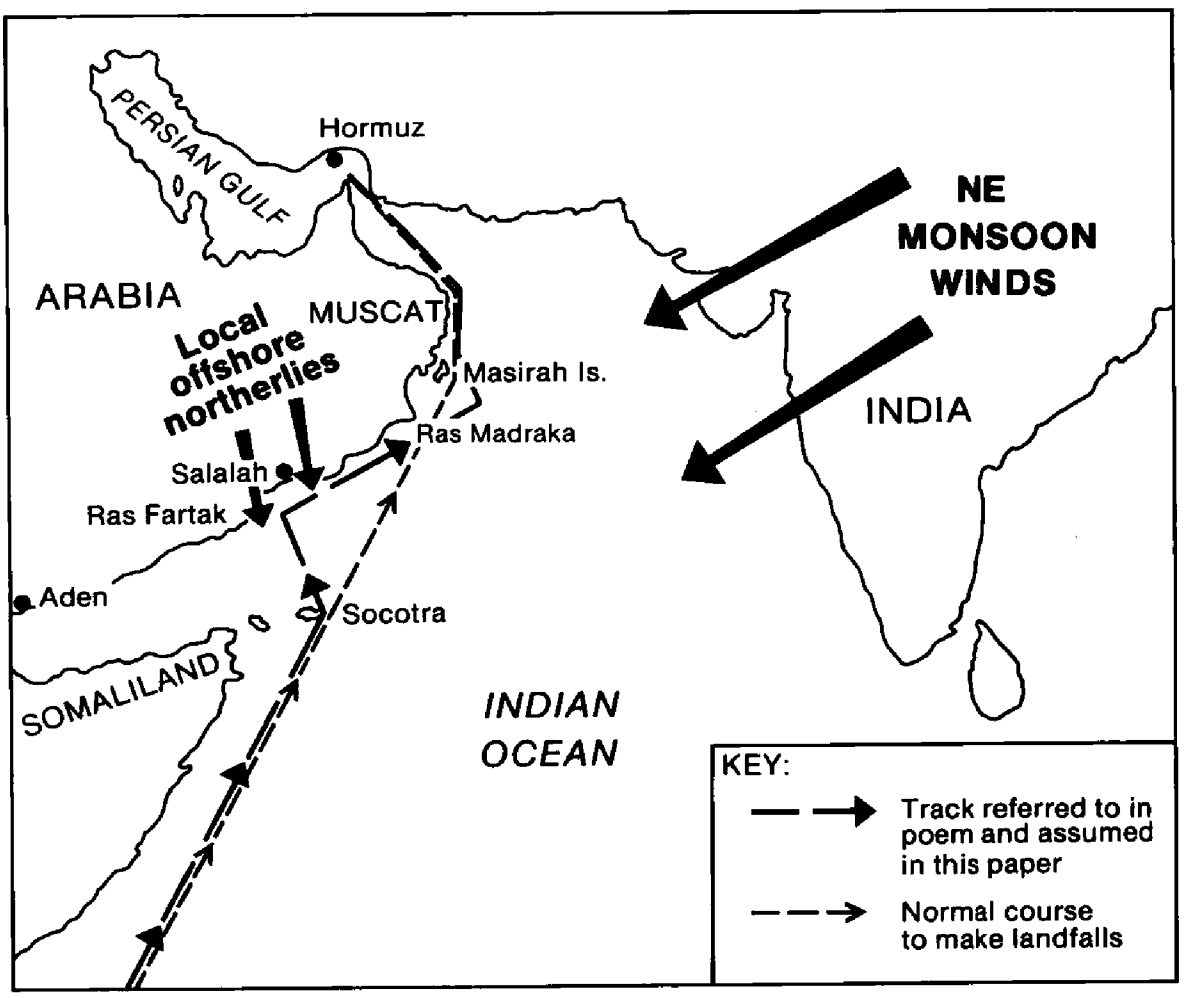

Figure 2. Significant tracks and winds

daytime insolation and cooling caused by night-time radiation give rise to pressure changes, the result of which is outflow at night from the Empty Quarter of cold, extremely dry air, spilling out over the escarpment beyond Salalah, or flowing down the wadies onto the Salalah plain, out over the narrow part of the plateau.

At this point the writer's personal experiences come into play; the memory of early morning winds of up to force 8, with relative humidity of less than 5 per cent, blowing from the north in December, and the experience of smelling the odours at up to 30 kilometres offshore in a light aircraft, being the factors which prompted the writing of this article. With winds of this nature battering the vegetation, the moisture and pollen with associated scents, would be carried far out to sea, possibly acting as aerosols, descending as cool air over the sea and being absorbed into the normal circulation whilst retaining its odoriferous characteristics.

The area in question receives precipitation of three separate types:

1. Thunderstorms — infrequently.
2. Cyclones — May to October, average 1 per year, but devoid of them 1 year in 3 (Pedgley).
3. South-west Monsoon — June to September; extreme regularity and known locally as 'the hundred days without the sun'.

The second type of rainfall would be relevant, as cyclones mainly approach or cross the coast near Salalah, i.e., between Ras Madraka in the north and Ras Fartak in the south (Pedgley). The third type of rainfall mentioned above, that of the monsoon season is caused by a rather complex combination of events. Between Ras al Hadd and Ras Fartak there is an area of relatively very cold sea especially in July and August (Figure 3), caused by the upwelling of deep cold water over the Socotra/Chagos or Carlsberg ridge to the south. This area of cold water probably accounts for the persistent cloud which occurs along the coast north-east of Ras Fartak.

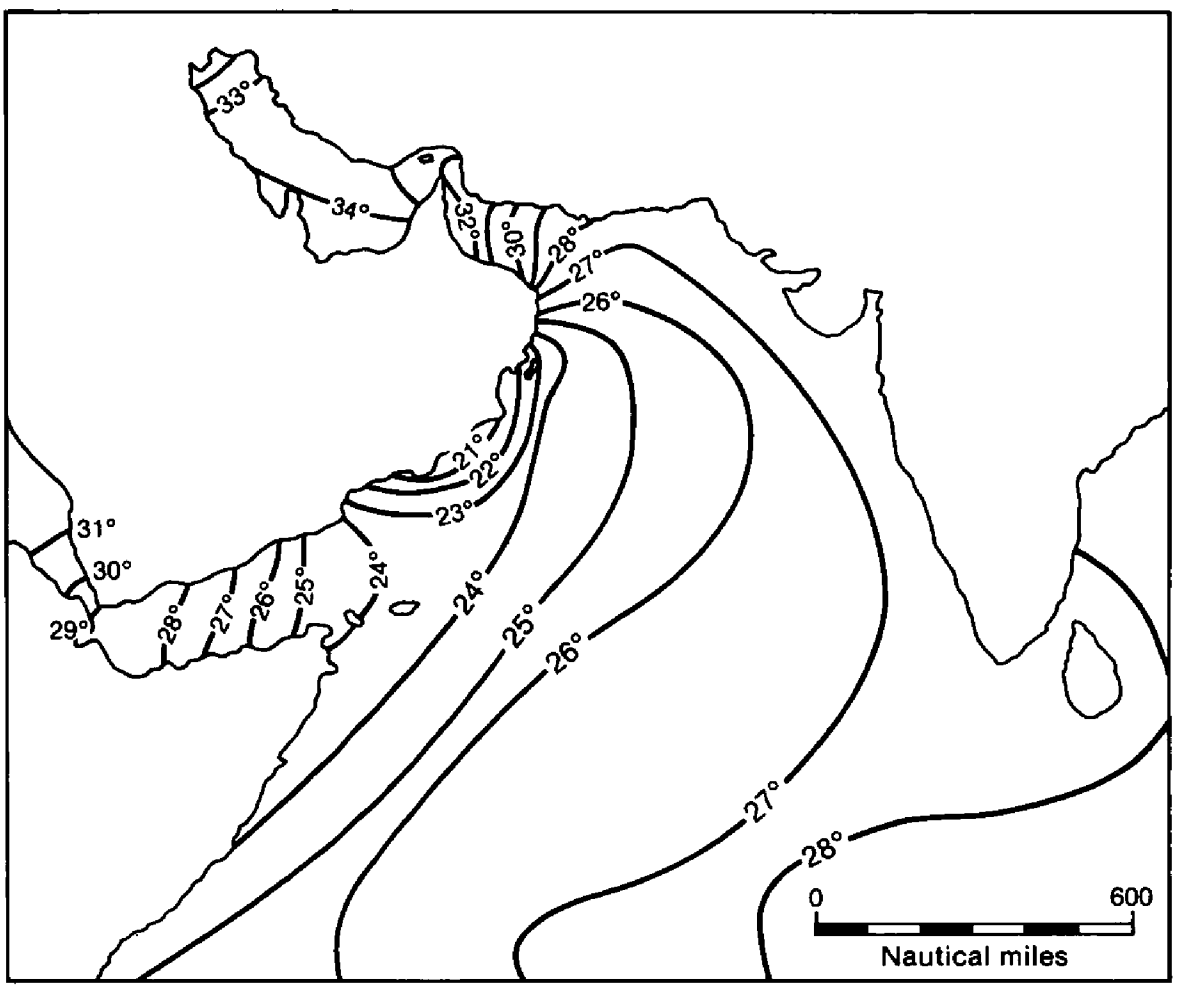

Figure 3. Mean sea temperatures (° C) in August

During the monsoon season the I T C Z advances north over the area and then retreats south again; this, combined with the cold sea temperatures, subjects the coastal strip and the area up to 80 kilometres inland to low cloud and persistent

drizzle which promotes luxuriant growth. During his tour of duty at Salalah, P.S. Welham extracted details of rainfall, visibility and low cloud at 0900 GMT for the months of June, July and August for the years 1942–1972, which when plotted graphically as five-day means, gave three peaks of bad weather, 17 June, 17 July (the worst) and 17 August; these dates are interpreted respectively as, an indication of the I T C Z moving north over the area, the average date of its most northerly position, moving south again. Table 1 appears to indicate that Salalah is the mid-point in the area, subject to both types 2 and 3 rainfall listed above.

Table 1 — Salalah rainfall averages (mm), 1943–1967

June	July	August	September
4.3	29.9	25.5	3.5

Note. The above can be examined in conjunction with Table 2 which compares average cloud amounts for the same months at 03 GMT and 12 GMT for Salalah, with Masirah and Riyan on the coast to the north and south respectively.

Table 2 — Average cloud amounts (oktas) for the months June to September

Place	Hour (GMT)	June	July	August	September
Masirah	0300	3.7	5.7	5.8	5.4
	1200	1.1	2.9	1.9	1.1
Salalah	0300	6.2	7.7	7.9	6.5
	1200	3.8	6.9	7.0	4.3
Riyan	0300	3.3	4.1	4.3	5.1
	1200	2.2	2.3	2.1	2.3

Conclusions

The above discussion is presented as an example of the factual background to nautical weather lore, the latter extracted from one of the major works of English literature.

The physical background with today's knowledge of local wind circulation makes possible the attempt to look into the facts behind such lore, and no doubt could be used to investigate other ancient sayings in like manner. It is evident that in the sixteenth century, the 'Sabean Odours' were a very important aid to navigation in the newly-charted vastness of the Indian Ocean.

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Weather Influences on Battles and Invasions*

By Lieutenant Commander S.J. Auty, R.N.
(Directorate of Naval Oceanography and Meteorology)

Caesar's Invasions BC 55, BC 54:
In order to invade Britain from France, Caesar needed a southerly component to the wind. He got this in August BC 55 but it was to prove to be the only time that the weather really favoured him. Once at sea the wind backed and increased to an east or northeast gale, driving Caesar's ships south. Some of his ships were close enough to Britain to shelter under cliffs but others had to run before the wind. Because most of the latter contained his cavalry, the gale effectively put paid to any invasion plans. Some ships were beached and damaged by storm surge, while others were flooded and sank or were driven ashore and wrecked. Three weeks after the start of the invasion, Caesar was back in France without having fought a single battle against the Britons. The synoptic situation which caused such havoc was not an unusual one for the time of year, namely a depression moving ENE along the north coast of France.

Caesar was still determined to invade, so he set about rebuilding his fleet and was ready to sail by June BC 54. However, a persistent north or northeasterly wind delayed matters and it was not until 20 July that he left in a gentle southwesterly. The wind died around midnight but the fleet was carried on a flood tide to mid-Channel and eventually landed at Deal. He beached his ships and marched inland but, again, he was thwarted by the weather. The night turned stormy and wrecked his fleet causing him to return to the beaches to effect repairs. These repairs took 10 days and during this period, persistent northwesterly winds prevented reinforcements sailing from France. On 10 September Caesar evacuated and sent half his army back to France with orders to return to help pick up his remaining men. Unfortunately very few of these ships did return, so on 15 September the remaining ships sailed for France in the northwesterlies. No doubt they expected the journey to be straightforward but again weather was against them, leaving them becalmed in the middle of the night. They had to row back to France!

The Spanish Armada 1588
On 30 July, the Armada sighted the English ships but the high sea state off the Southwest Approaches prevented any engagement and it was not until 7 August, with the Armada east of Drake, that the attack with fire ships was launched. Drake gave chase up the North Sea until 12 August and the Armada continued to sail north. On 21 September the Armada was wrecked on the west coasts of Scotland and Ireland. Out of 130 ships, 51 were lost whereas Britain only lost 3100 men and all but 100 of these died through food poisoning. Professor Lamb, a leading authority on climatology, stated that the summer of 1588 was outstanding for its number of storms, brought about by the dominance of the arctic or polar anti-cyclone, pushing the polar front south, so that the depressions tracked up the Channel. There was sea ice near Iceland and the jet stream was stronger than at any time in the present century. He concluded that

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* The second of three sections of an article reproduced from *DNOM Newsletter*, Summer 1986, by kind permission of the Director of Naval Oceanography and Meteorology.

the climate of 1588 fitted that of a 'mini' ice age, so it would appear that not only should Britain be grateful to Drake, but also to the weather. However, my own research reveals another possible influence of the wind on the outcome of the battle. On the morning after the battle of Gravelines, a blustery northwesterly wind threatened to drive the Armada towards the banks and shoals near Zeeland. Not wanting to turn and face the English fleet, the Spaniards were helpless, but, only a matter of yards from shipwreck, the wind gusted and backed southwesterly, allowing them to escape towards the safer reaches of the North Sea. It could be argued, therefore, that a subtle shift in wind denied the English the total victory which they had fought so hard to win. It is also hard to believe that the storms off Ireland were solely to blame for the destruction of the Armada. The English fleet had inflicted severe damage on both ships and men, so it is likely that the Armada was in poor physical condition to resist heavy weather. It would be fairer to say that the outcome was attributable to both the attacks of the English fleet and the weather.

PRESENTATION OF BAROGRAPHS

The fortieth annual barograph award ceremony took place at Bracknell headquarters on 28 April 1987. Following his decision in 1948 to introduce a special long-service award to voluntary marine observers in recognition of long and meritorious service, Sir Nelson Johnson, Director of the Meteorological Office, awarded barographs to four shipmasters from Port Line, Furness Line, Manchester Liners and Clan Line respectively, in that year.

As detailed on page 79 of the April 1987 edition of this journal, four shipmasters were again named by the Director-General to receive awards, and three of them were able to be present to receive their inscribed barographs from Dr J.T. Houghton personally. They were Captain G.C. Barrett (P. & O. Containers Ltd.), Captain J.K. Cooper (Cunard Shipping Services Ltd., retired), and Captain A.J. Palmer (P. & O. Containers Ltd.). (See photograph opposite page 204.) The fourth nominee, Captain F.R.N. Best, was at sea with his command, *Stena Oceanica*, and it is hoped that a special presentation can be made to him when his ship calls at a U.K. port in the future.

Dr Houghton spoke to the assembled company of guests, including directors and Marine Superintendents of some of the shipping companies and of the Met Office, saying that ships' weather observations were still required as much as before from the large areas of ocean which cover the earth. Although much information was now obtainable from satellite instruments the need for surface verification would continue, and from the sea the voluntary observing ships were the main source of weather data.

It was noted that on the day that a Cunard Company Master was receiving his award, that company's most illustrious ship, *Queen Elizabeth 2*, also a voluntary observer, had returned to Southampton on her shakedown cruise, following her £100m refit in West Germany to give her a further 20 years of useful life.

Presentation of barographs at Bracknell Headquarters on 28 April 1987. Left to right: Dr J.T. Houghton, Director-General, Met. Office; Captain G.C. Barrett and Mrs Barrett; Captain J.K. Cooper and Mrs Cooper; Captain A.J. Palmer and Mrs Palmer; Dr D.N. Axford, Director of Services, Met. Office. (See page 204.)

Opposite page 204

AURORA NOTES OCTOBER TO DECEMBER 1986

By R.J. Livesey

(Director of the Aurora Section of the British Astronomical Association)

In Table 1 are summarised the auroral observations received from ships during the above period. In Table 2, I have listed important auroral activity reported principally in the regions of North America, the North Atlantic Ocean, and north-west Europe.

Table 1 — Marine Aurora Observations October to December 1986

Date	Ship	Geographic Position	Time (GMT)	Forms in Sequence
1/2 Oct.	*ACT 7*	46° 06'S, 112° 30'E	1350–1430	HG, R_2RR
1/2	*Cumulus*	57° 00'N, 20° 00'W	2245	qN
2/3	*Montarik*	68° 34'N, 06° 48'E	1915–2052	HB, aRR, cRR, maB
3/4	*Montarik*	64° 09'N, 05° 45'E	2127–2136	G, RR, G
29/30	*Montarik*	74° 41'N, 10° 36'E	1920–2131	HB, spiral B
30/31	*Montarik*	70° 22'N, 07° 57'E	2031–2300	HA, spiral B, pRR
3/4 Nov.	*Albright Explorer*	50° 45'N, 14° 15'W	0530–0550	G, RR
4/5	*Cumulus*	57° 16'N, 19° 15'W	0345–0440	qN
26/27	*Montarik*	77° 14'N, 11° 28'E	1630–1702	mB, m_2B, circular B
21/22 Dec.	*Cumulus*	56° 08'N, 19° 07'W	2245	qN

KEY: a = active, c = corona, m = multiple, m_2 = 2 forms, p = patch, q = quiet, B = band, G = glow, HA = homogeneous arc, HB = homogeneous band, N = aurora of specified form, R_2 = medium rays, RR = rayed structure.

The drawings accompanying the written auroral reports entered in the meteorological logbooks frequently display artistic talent hidden away among our mariners. In practical terms, these drawings are very welcome, as they augment considerably the value of the written and coded reports. Over the years, I have received drawings showing a variety of styles, from the simple sketch, to the fish-eye all-sky presentation. In one case, the observer made beautiful water-colour paintings on black paper, and in another case, on brown paper.

Although many people look around to see what is going on about them, the observer consciously makes an effort to study and record what is seen, either via a good memory, or in some permanent form, so that there can be recall of the subject matter later. In the history of art, impressionist painting began when artists forsook their studios to paint from life, in the open air. It is perhaps a good thing that it is difficult to make good photographs of the aurora from a moving ship at sea, though I hasten to add that it is not impossible. Rather would I encourage observers to draw what they see. In this way they will study and remember what they see far more readily than when pointing a camera and exposing film. In recent times, I myself have forsaken the camera for the sketch book and paint pot because I have a better understanding and recall of the subject matter.

During the period under review, m.v. *Montarik* (Captain W.F. Jeffrey) has been voyaging in high geographic and geomagnetic latitudes, thereby passing under the auroral oval in the auroral zone. Consequently, the ship's crew have been able to observe some interesting forms in the overhead aurora. Third

Table 2 — Auroral Activity reported October to December 1986 (excluding isolated and doubtful events).

Date (Night)	Location and Numbers of Observers	Geomagnetic Latitude Lowest	Highest	at Storm Peak	Maximum Storm Activity Code*	Time (GMT)
1/2 Oct.	'Lima', Norway, Southern Ocean (3)	63	66	66	3	1350–2245
2/3	North Scotland, Atlantic Ocean (4)	61	68	61	6	1915–0040
3/4	Orkney, Finland, Atlantic (4)	61	64	61	6	2035–0130
5/6	Orkney, Finland, Norway (4)	60	66	60	5	1920–0230
9/10	Finland (4)	58	61	61	3	1920–2230
13/14	Alberta, North Scotland, Finland (11)	57	64	57	7	1830–0400
27/28	North Scotland (3)	61	61	61	5	2100–2331
30/31	North Scotland, Finland, Norway, Atlantic (6)	60	70	60	6	1700–2300
3/4 Nov.	Manitoba, Finland, North Scotland, Atlantic (4)	56	62	59	6	2200–0550
5/6	Orkney, Norway (3)	61	66	61	2	1830–2230
24/25	North Scotland, Finland (6)	59	62	61	6	1750–0042
25/26	Alberta, North Scotland (7)	61	64	61	6	1700–0100
26/27	Finland, Atlantic (3)	61	74	74	6	1550–2130
29/30	Orkney, Finland (5)	58	61	58	5	1630–0000
13/14 Dec.	Alberta, Finland (3)	62	64	62	5	2005–0830
18/19	Finland (3)	60	62	60	5	1955–2050
19/20	Alberta, Finland, Norway (4)	60	68	64	3	2010–0700
21/22	North Scotland, eastern Atlantic (3)	61	63	62	5	2000–0450

*Storm Activity Code: 2 = Homogeneous arc or band, 3 = Rayed arc or band, 5 = Active storm, 6 = Coronal structures, 7 = All sky storm.

Officer Mr T. Karamat made drawings of a variety of bands, glows and coronae, and on October 29th and 30th, recorded spiral structures in which homogeneous bands wound themselves up at one end. On 26th November, Mr G Rasul, Chief Officer, utilised the all-sky fish-eye technique to record a variety of banded structures, the most interesting of which was a homogeneous band which formed a complete heart-shaped loop. Earlier in the year, on 25 September, Mr K.R. Khan, Second Officer, produced drawings of overhead rayed bands with the formation of semi-spiral structures at one end.

To the aurora data collator such as myself, these sketches spring to life when taken into account with the written report, so that I can relive the activity as the observer saw it. The production of these sketches is thus highly appreciated, and as before stated in these reports, sample copies are exhibited at the Annual Exhibition Meeting of the British Astronomical Association. Please keep them coming.

Now that we have come to the end of sunspot cycle twenty-one, and are entering cycle twenty-two, it may be of interest to review activity in the last eleven years. The data have been simplified and are shown in the graphs of Figures 1–4.

It is clear that all observers reported a double peak in activity; one related to the development of the sunspots, and a second peak associated with the decline of the sunspots when the coronal holes expanded into the mid-latitude and equatorial planes of the sun to cause their own brand of aurora. During the cycle, there have been the storm type aurorae associated with transient, explosive solar events, such as the flares and disappearing filaments. Then there have been the recurrent events due to the coronal hole and equatorial solar wind streams.

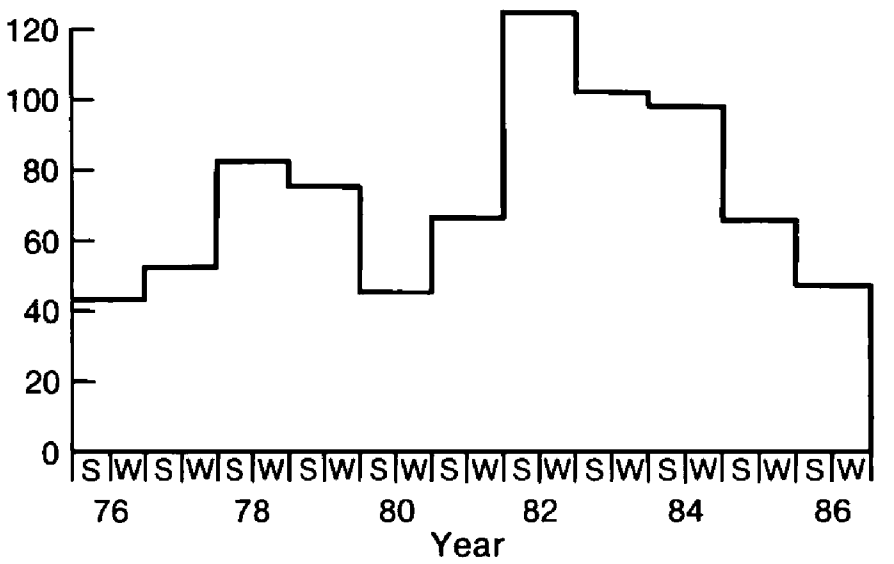

Figure 1. Days per annum on which the planetary magnetic index K_p averaged 5 or more for at least 3 hours in a 24-hour day.

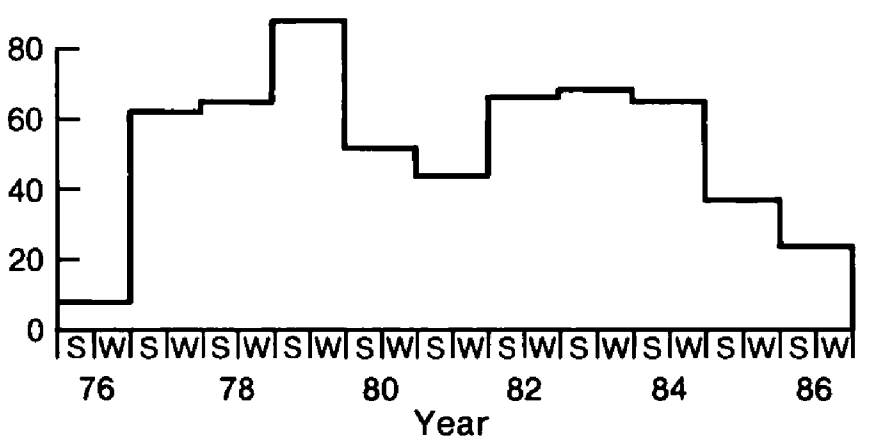

Figure 2. Aurora nights per annum at geomagnetic latitude 59 degrees (central Scotland).

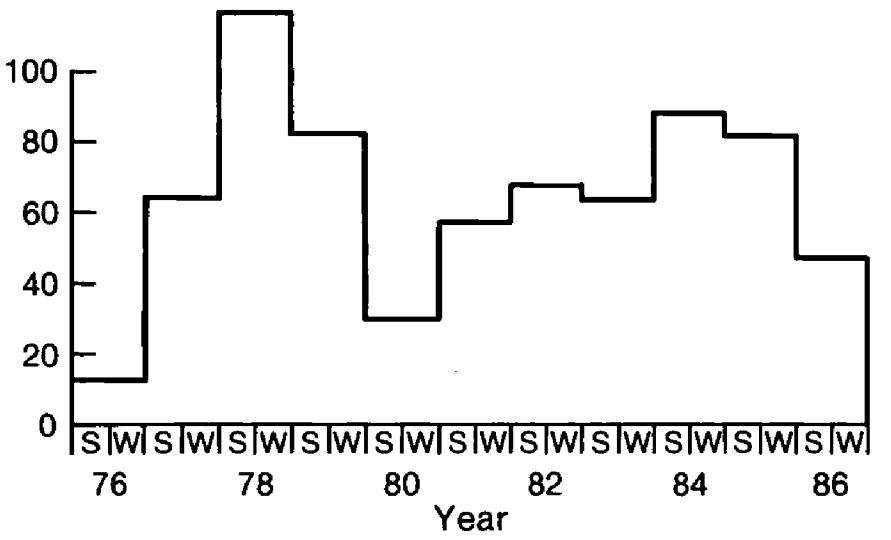

Figure 3. Days per annum on which radio aurora and signal distortion occurred.

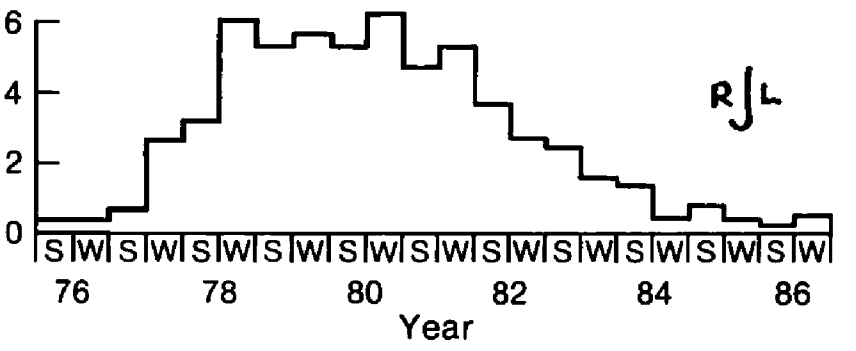

Figure 4. Six-monthly means of active solar areas measured in a 62-mm diameter refractor.

It has been an interesting cycle, the study of which has materially been assisted by the many observations from our marine friends, to whom I offer my grateful thanks. The question as to whether or not there is any value in continuing to observe the aurora from the bottom of the atmosphere when scientific progress in research would most probably be made at specific establishments in the auroral zone, was raised again recently at a meeting of professionals and amateurs. My advice is to follow the motto of the Royal Astronomical Society and 'If it shines — observe it' for one's own personal satisfaction. One can never tell, as of a new-born baby, what use will come of it to mankind. So, as we enter the next sunspot cycle, I wish you safe voyages, and if you come into sight of the aurora, I shall be glad to have your observations.

From *The Marine Observer* 40 Years Ago*

The master of a merchant ship has, since Noah first put to sea in his ark, been a man of very great responsibilities. Once clear of his home port his name aboard the ship is law — the safety of the ship, her crew and passengers and cargo are in his hands. He must, of necessity, combine the qualities of business man, lawyer, doctor, diplomat, and above all, he must be a seaman. Science has done much to assist him in carrying out his task in the provision of power-driven ships, radio and navigational aids, but there comes a time, even in the largest and most modern ship, fitted with every conceivable scientific improvement, when the master's personal skill as a seaman will be called to account. And in this modern, competitive age, when the value of shipping not only nationally but internationally is greater than ever before, it is more than ever necessary that the ship master should not be found wanting. It is his duty to his country, to his owners, to his ship and those who sail in her, as well as to himself, to be proficient in every branch of his profession. As the master, so the ship's officers — for the officer of the watch holds the safety of the ships in trust for the master. And the junior officer of today is the master of tomorrow.

Every ship's officer aspires to be an efficient seaman — a sailorman — but the attributes are many and not easy to attain, and many of them are only acquired in the hard school of experience.

One of the essentials to the efficient seaman is that he should respect the elements in which he sails and on which he is dependent for his livelihood, for the sea is a wild, unpredictable and fickle mistress who suffers not fools gladly, and the man who courts her without respect will surely be paid out for his temerity. A study of the monthly shipping casualty lists published by *Lloyd's List* will show that even in this age of large modern steel ships of considerable size and power, a surprisingly large number of marine casualities are directly due to the weather and its effects, and it is certain that many others (e.g. groundings and collisions in fog), are indirectly due to the same cause. In peace-time it is probably true that apart from fire and explosion most of the perils of the sea are directly or indirectly caused by the weather or its effect upon the sea, and it is for this reason essential that the seaman, as the farmer, should be weather-wise. A knowledge of ocean currents, winds and tides is just as valuable now as it was in the days of the sailing ship, in fact, it may be more important, for with the provision of scientific aids to navigation coupled with the up-to-date meteorological information and frequent weather forecasts which are now available to the seaman, more is expected of him. But it must always be borne in mind that radar, radio, echo-sounding and the like are merely aids to navigation, and that meteorological information is of little practical value unless it is used intelligently and with a discreet and seamanlike appreciation of its limitations...

... It is a pity everybody cannot spend at least a few years of their lives at sea; if this could come about there would be far less international complications, for seamen, no matter their nationality, can always co-operate and understand one another — the language of the sea is international.

Marine Superintendent

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* From the Editorial, October 1947 edition.

Personalities

(Readers are invited to notify the Editor of observing officers retiring from the Navigating and Radio Departments.)

OBITUARY—CAPTAIN E.H. GREGSON died peacefully after a short illness, on 25 June 1987, a few days before his 59th birthday.

Edwin Harold Gregson served his apprenticeship with Denholms and joined the Pacific Steam Navigation Company in 1948. He remained in ships of the Furness Withy Group until his early retirement in January 1985, having been made Master in 1969.

When in command of *Jamaica Producer* in February 1979, Captain Gregson rescued the crew from a shipwrecked Greek vessel in mid-Atlantic, and for this he was awarded the RSA Thomas Gray Silver Medal, the Emile Robin Award and the Department of Trade Plate, the latter being in the form of a clock presented by the then Minister of Shipping, Mr Norman Tebbitt, M.P.

He was a Liveryman of the Honourable Company of Master Mariners, Younger Brother of Trinity House and a Fellow of the Nautical Institute. He had just completed his two years as Chairman of the London Branch of the latter body and was also Honorary Assistant Marine Superintendent for *Wellington*.

Captain Gregson was an ardent weather observer and submitted 43 meteorological logbooks during his 40 sea years, 12 of these logs being classed as Excellent, and he was rewarded for this excellence in 5 of his observing years.

He will be sorely missed by the many other maritime organisations which he supported: he was a presenter for the *Mary Rose* Information Group, Friend of the Cape Horners Association, Member of the World Ship Society and Chairman of its mid-Essex Branch in 1986, also a Fellow of the Royal Society of Arts. He gave many slide lectures on nautical subjects from his own extensive collection which includes many fine ship photographs.

We offer our condolences in their sad loss to Edwin's wife Maura and to other relatives and friends. A retirement notice appears on page 103 of the April 1986 edition of this journal.

RETIREMENT—MR R.D. CAUSE was obliged to take early retirement from his career as Radio Officer, at the age of 45 in July 1987, due to medical circumstances.

Richard David Cause was born in April 1942 and first went to sea at the age of 20 with the International Marine Radio Company, now known as ITT Marine, on board Houlder Brothers m.v. *Orelia*. In 1965 he joined Elder Dempster Lines as Radio Officer and thence integrated with Ocean Fleets Ltd. He transferred to Overseas Containers Ltd in 1982.

The first meteorological logbook to receive the full co-operative treatment from Mr Cause was received from the *Glenearn* in April 1968, and this was one of 23 logs of his to be assessed as Excellent. In his 17 years association with transmission of weather messages he was involved in no less than 46 logs and he received Excellent Awards in 1975, 1977, 1981, 1983, 1984 and 1986.

Despite his medical retirement from the sea, Mr Cause anticipates having a further rewarding working life and we wish him much good fortune in that, and thanks for his efficient contribution over the years to voluntary weather observing.

RETIREMENT—CAPTAIN P.R. WALLER retired on 13 March 1987 after 33 years at sea on BP ships.

Peter Reginald Waller was born in 1936, educated at Brighton Grammar School and spent 3 months at King Edward VII College before joining m.v. *British Vision* in July 1954. He gained his Master's Certificate in June 1964 and served as Relief Master/Chief Officer from 1972; he was then promoted to command the *British Forth* in 1980. Captain Waller remained with BP until he transferred to Acomarit SA of Geneva but remaining in BP ships to his retirement.

He submitted his first meteorological log from *British Consul* in September 1985 and had 3 Excellent logs in the total of 32 sent to the Met. Office; he received an Excellent Award in 1981.

As Master of *British Trent* he was awarded the South Atlantic Medal with rosette in 1982 after forming part of the Task Force Support Unit during the Falklands compaign. He has also served on ships trading to the Arabian Gulf during the Iran/Iraq war.

Our good wishes go to Captain Waller in his retirement, with his hopes of seeing more of his wife and 4 children, two of whom are serving in the Royal Navy.

Book Reviews

Violence at Sea, edited by Brigadier (retd) Brian A.H. Parritt, CBE, 210 × 140 mm, 261 pp., paperback. ICC Publishing S.A., 38 Cours Albert 1er, 75008–Paris, France. Price: £16.00, obtainable, post free in U.K., from ICC International Maritime Bureau (IMB), Maritime House, 1 Linton Road, Barking, Essex IG11 8HH.

Following the terrorist attack on the Italian liner *Achille Lauro*, the IMO, in late 1985, began to examine the security needs at ports and on ships and it was suggested that standards for airline and airport security be adopted for the maritime industry. The ICC International Maritime Bureau accordingly hosted a workshop at San Jose, California, in March 1986 to debate the 'Protection of ships and ports against terrorist attacks'. The results of the lively discussions were analysed and presented as a series of decisions, and this book sets the scene with a series of background papers written by many different experts to review terrorism, acts of war and piracy, and counter-measures to prevent terrorism.

In statistical terms terrorist incidents are growing at an annual rate of between 12 and 15 per cent and it is a sad fact that violence will continue to have a malignant influence on crews, passengers and cargo. This book takes a fresh look at the implications of terrorism at sea and explains how these risks can be reduced. The various papers deal with all aspects of criminal violence at sea, the practical measures to be taken by ports and ships' crews to prevent terrorist attack and the role of military force in protection of the innocent victims. The legal and insurance implications in a maritime context are also debated, including the legal implications of armed merchant ships and the historical development of an international legal response to terrorism at sea. Mr Eric Ellen, Director of the International Maritime Bureau which hosted the workshop

which inspired this useful guide, contributed the first appendix on the subject of piracy, particularly the serious problem it presents off certain west African ports and in the Straits of Malacca and Singapore. He makes a number of important recommendations to governments and shipowners requiring positive and immediate action to reverse this dangerous trend. Seafarers passing through areas prone to attack may not be taking adequate precautions, and this comment alone should be sufficient reason to persuade shipping companies to consider whether any shipmaster should proceed to sea without a copy of this revealing and useful book on board.

The immortal Warrior by Captain John Wells RN. 185 mm × 250 mm, 263 pp., *illus.* Kenneth Mason, The Old Harbourmaster's, 8 North Street, Emsworth, Hampshire PO10 7DD. Trade distribution by J.M. Dent & Sons (Distribution) Ltd., Dunhams Lane, Letchworth, Herts SG6 1LF. Price: £11.95.

This is the story of Britain's first and last battleship, H.M.S *Warrior*, which was never called upon to fire a shot in the heat of battle, compellingly told by the research historian, Captain John Wells. Now chairman of the *Warrior* Association, the author has a fascinating and complete tale to tell, of the toughness and spirit of the Victorian Navy and of the vision, determination and staying power of those who have recently brought the great ship back from the graveyard to her rightful place in Portsmouth.

The *Warrior* story is about the people who saw the need for a warship to rival the threat of the French *Gloire*, the people who designed and built her for the Navy of the 1860s, those who manned her over the years and finally the people who had the vision to bring her back to life for the national heritage. Captain Wells uses a novel method in the text to bring alive many of the events in the ship's chequered history, employing italicized print in recreating dialogue and description to illustrate what might have occurred.

This most detailed history relates how the threat of the French ship *Gloire*, which was ready ahead of the *Warrior* in August 1860, caused the Admiralty to speed the construction of the *Warrior* at Bow Creek, east London, and which was 8 months late when she was commissioned in August 1861. This did not prevent their Lordships from being amazed at the size and cost of the ship they had ordered, and costing about £375,000 for her 8561 tons load displacement, she did not seem to answer the description of the vessel that would combine stability with vulnerability. They decided, however, to see what they could make of her, and Captain the Honourable Arthur Auckland Leopold Pedro Cochrane duly took command of John Scott Russell's design.

Interspersed with illustrations of many types, specially prepared by Gary Cook while a student of Technical Illustration at the Bournemouth and Poole College of Art and Design, eleven chapters cover all aspects of the building, fitting out, commissioning and trials of the ship. After her service life, the *Warrior* became part of the *Vernon* torpedo school in Portsmouth harbour before relegation as an oil fuel pontoon hulk at Pembroke Dock. The restoration is well described, telling of her towage to Hartlepool where the world's largest maritime project ever undertaken was accomplished by the *Warrior* Preservation Trust.

Twelve detailed appendices covering every part of the ship's personnel, construction, engines, sails and seamanship, armament and equipment help to make this a compelling work about a historic ship. If the book serves only to

encourage readers to visit *Warrior* on display afloat adjoining *Victory* and *Mary Rose* at Portsmouth, John Wells' efforts will be rewarded, but there is much more to this work than a mere visitor's guide.

Ship in the Wilderness by Jim Snyder and Keith Shackleton. 220 mm × 297 mm, 208 pp., *illus.* J.M. Dent & Sons Ltd., Aldine House, 33 Welbeck Street, London W1M 8LX. Price: £14.95.

The inspiration for this unusual and colourful book was the wanderings across the world's oceans of the adventure ship *Lindblad Explorer*. This unique ship carried enthusiasts, artists and naturalists to many remote parts of the Earth for more than 15 years from 1969, calling at exotic locations further north and south than any passenger ship before her. Besides the authoritative and informative text, it is undoubtedly the 50 water-colours of Keith Shackleton and the 150 or so photographs by Jim Snyder that make this such an unforgettable work.

Sir Peter Scott, who travelled many times in the *Lindblad Explorer*, ably summarizes the mood of the book in his foreword. 'To see the wildlife and the fantastically beautiful scenery of the Antarctic; to gaze upon the swamp forests of the Asmat in West Irian, to savour the unbelievable colours and shapes of the Indo-Pacific coral reefs, is to become imbued with the determination to prevent them from being destroyed by the pressure of an ever-increasing human population... It is my belief that, in showing that world to many hundreds of people down the years, *Lindblad Explorer* has played an important part in the general awareness of the need for conservation. And in producing this book, the authors show us many of the wonderful wild places of the world and the people who live in them. I am delighted to have been invited to wish *Ship in the Wilderness* success.'

It was only at about the sixth book shop visited that I came across this publication when searching for a suitable 1987 'special' Excellent Award book. Whether this was an indication of its success or of its limited distribution is still in doubt, but I would recommend anyone with even an ounce of the travel or adventure urge in them to go out of their way to find a copy of this unusual and beautifully illustrated book.

J.F.T.H.

Notices to Marine Observers

CHANGES TO SHIPS' CODE GROUPS

The following minor changes to all ships' observing codes come into force officially on 1 November 1987. The corrections are incorporated in the July 1986 reprint of the *Ships' Code Card*, Met.O.694C.

N,Nh — Scale for Cloud Amount (Table 7).	After code figure 9, add new code figure / (solidus) — Cloud cover obscured for other reasons or not observed.
ff — Speed of Surface Wind (Table 9).	Below Beaufort wind table, add note: When the wind speed is more than 99 units ff is reported as 99 and a group 00fff is reported immediately after the group Nddff.

Other publications affected include *Ships' Code and Decode Book*, Met.O.509, *Ship's Meteorological Logbook*, Metform 911A and *Marine Observer's Guide*, Met.O.477A.

ALTERATIONS TO TITLE OF MARINE DIVISION PUBLICATION

As from the August 1987 annual reprint of the brochure *Weather Bulletins, Gale Warnings and Services for the Shipping and Fishing Industries*, the title of 'Met.O.Leaflet No. 3' will be dropped from this publication.

Originally one of a series of numbered leaflets issued by the Met.Office, Leaflet No. 3 was totally revised in 1978 and produced in glossy brochure form with two-tone front cover and chart of shipping forecast areas. Recent Met.Office brochures have been printed in new styles and the numbered leaflets are no longer appropriate.

The *Weather Information for Shipping*, *Ship Routeing* and other brochures are available free of charge, on request.

MEDAL FOR A DEED OF PROFESSIONAL MERIT PERFORMED AT SEA

In recognition of the remarkable skill which is so constantly displayed at sea, the Council of the Royal Society of Arts, which administers the Thomas Gray Memorial Trust, again offers the Society's Silver Medal to a member of the British Merchant Navy for a deed which, in the opinion of the experienced mariners to be appointed as judges by the Council, is of outstanding professional merit.

The period to be covered by the offer will be the year ending 30 September 1987 and deeds of character worthy to be considered for this offer may be brought to the notice of the Council by any person or organization not later than 31 December 1987, by writing to the Secretary, Mr Christopher Lucas, at the Royal Society for the encouragement of Arts, Manufactures and Commerce, John Adam Street, Adelphi, London WC2N 6EZ, telephone 01 930 5115. They will not however, be considered by the judges, unless they have been endorsed by a recognised authority or responsible person able to testify to the deed to be adjudged.

NAUTICAL INSTITUTE ESSAY COMPETITION 1987

METEOROLOGICAL MEASUREMENT AND THE MARINER

A prize of £250, sponsored by Noble Denton Weather Services Ltd., will be awarded to the best submission on 'Meteorological Measurement and the Mariner'.

The essay should not be more than 3,000 words and cover the specification of a problem and the practical steps which can be taken to provide more accurate data from ships.

It is appreciated that meteorological forecasting and hindcasting is international in character and depends upon many sources of data. The essay has been designed to enable members to suggest ways of improving the accuracy of specific meteorological measurements and/or estimations at sea.

The essay is open to all Nautical Institute members in any country. All submissions should arive at The Nautical Institute, 202 Lambeth Road, London SE1 7LQ, not later than 31 December 1987.

NAUTICAL STAFF OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE, GREAT BRITAIN

Headquarters: Meteorological Office (Met.O.1a), Eastern Road Annexe, Bracknell, Berks RG12 2UR. (Telephone: 0344 420242)

Captain G.V. Mackie, Marine Superintendent, (Ext. 2456)
Captain R.C. Cameron, Deputy Marine Superintendent. (Ext. 2543)
Captain J .F.T. Houghton, Nautical Officer, (Ext. 2738)
Captain M.L. McN. Coombs, Nautical Officer, (Ext. 2461)
Captain P.B. Hall, Ship Routeing Officer. (Ext. 2577 or 0344 484961 direct line)
Captain C.A.S. Borthwick, Ship Routeing Officer
, Ship Routeing Officer
Captain J.A. Williamson, Sea Ice Officer. (Ext. 2594)

For Port Meteorological Officers, see over.

Port Meteorological Officers:

North-west England—Mr W.G. Cullen, Master Mariner, Port Meteorological Officer, Room 218, Royal Liver Building, Liverpool L3 1HU. (Telephone: 051 236 6565)

South-east England—Captain C.R. Downes, Port Meteorological Officer, Daneholes House, Hogg Lane, Grays, Essex RM17 5QH. (Telephone: 0375 378369)

Scotland and Northern Ireland—Captain S.M. Norwell, Port Meteorological Officer, Navy Buildings, Eldon Street, Greenock, Strathclyde PA16 7SL. (Telephone: 0475 24700)

South-west England—Captain D.R. McWhan, Port Meteorological Officer, Southampton Weather Centre, 160 High Street, Southampton SO1 OBT. (Telephone: 0703 220632)

North-east England—D.H. Rutherford, Port Meteorological Officer, Room D622, Corporation House, 73–75 Albert Road, Middlesborough, Cleveland TS1 2RZ. (Telephone: 0642 241144, Ext. 275)

East England (and Ocean Weather Ship Officer)—Captain A. Britain, Port Meteorological Officer, c/o Department of Transport, Posterngate, Hull HU1 2JN. (Telephone: 0482 20158 or 223066, Ext 26)

Bristol Channel—Captain A.F. Ashton, Port Meteorological Officer, Cardiff Weather Centre, Southgate House, Wood Street, Cardiff CF1 1EW. (Telephone: 0222 21423)

INDEX TO VOLUME 57, 1987

Subjects of *Notices to Marine Observers*, photographs and persons named in *Retirement* and *Obituary* notices are indexed under these general headings.

ACT 1, 68, 174
ACT 2, 68
ACT 7, 15, 107, 178
ACT 8, 108
Ahmad Al Fateh, 172
Albright Explorer, 168
Arctic sea smoke, North Atlantic, 12
Asian Thistle, 60
Atlantic Conveyor, 170
Atlantic Star, 55
Aurora Borealis:
  Barents Sea, 188
  North Atlantic, 24, 113
  North Sea, 24
  Norwegian Sea, 25
  Scottish waters, 25
Aurora notes, 34, 79, 129, 205
Aureole and Lunar eclipse, Coral Sea, 60
AUTY, S.J. Lt. Cmdr. Weather influences on battles and invasions, 128, 203
Awards, Special long-service:
  BARRETT, CAPT. G.C., 79
  BEST, CAPT. F.R.N., 79
  COOPER, CAPT. J.K., 79
  PALMER, CAPT. A.J., 79

Barographs, Presentation of, 204
Bat, Caribbean Sea, 64
Battles and invasions, Weather influences on, 128, 203
Benhope, 53
Bioluminescence:
  Eastern North Atlantic, 58
  Equatorial Atlantic, 187
  North Atlantic, 56, 110
  North Sea, 57
  South Atlantic, 58, 110, 111
Birds:
  Arabian Sea, 182
  Black Sea, 182
  East China Sea, 18
  Gulf of Aden, 107
  Indian Ocean, 108, 183
  North Pacific, 185
  South Atlantic, 63
  Southern Ocean, 61
  Strait of Malacca, 185
Book Reviews:
  A Century of North Sea Passenger Steamers, Ambrose Greenway, 85
  Aurora, the Northern Lights in Mythology, History and Science, Harald Falck-Ytter 40
  Flags at Sea, Timothy Wilson, 135
  Floodshock, Antony Milne, 137
  JANET: The Restoration of a Victorian Yacht, Jonathan Watson, 39
  Ocean ships, David Hornsby, 39
  Ship in the Wilderness, Jim Snyder, Keith Shackleton, 213
  Storm, A.B.C. Whipple, 41
  The immortal Warrior, Capt. John Wells RN, 212
  Violence at Sea, Brig. (Retd) B.H.A. Parritt, 211
Bora Universal, 56, 100
British Forth, 59
British Ranger, 106, 175, 181
British Respect, 52
British Test, 9
Broompark, 26
BURT, S.D., A new North Atlantic low pressure record, 122
Butterflies:
  Indian Ocean, 22
  Mediterranean, 21

California Star, 66
Cardigan Bay, 97, 182
Cast Husky, 8, 113
Cetacea:
  Eastern North Atlantic, 101
  Indian Ocean, 102
  Savu Sea, 16
  South Pacific, 16, 103
  Southern Ocean, 15
  Tasman Sea, 178
  Western North Pacific, 103, 179
Charles Darwin, 180
Corposants, Moçambique channel, 52
Crestbank, 20
Cumulus, 110
Currents:
  Indian Ocean, 100
  North Atlantic, 54
  South China Sea, 175

Depression:
  Bristol Channel, 9
  North Atlantic, 168, 169
  South Pacific, 51
Discoloured water, North Pacific, 14
Discovery Bay, 16
Dolphins see Cetacea
Dust, Eastern North Atlantic, 53

Editorial, 4, 166
Ellerman Lines-Long association with shipowners, 74
Encounter Bay, 183
Esplanade, 111
Esso Demetia, 24, 112
Excellent Awards, 90

Falmouth Bay, 54
Farland, 169
FEDOROV, K.N. and A.I. GINZBURG, Phenomena on the sea surface, as studied from visual observations, 116, 190
Fish:
  Ceram Sea, 180
  North Atlantic, 104
Fleet Lists:
  Australia, 44, 153
  Canada, 154
  Great Britain, 42, 140
  Hong Kong, 156
  India, 157
  New Zealand, 44, 161
Flashing light, South Pacific, 68
Flinders Bay, 21
Fog bank, South African waters, 53
Fort Frontenac, 16
Forthbank, 174
Forum New Zealand, 178
Front, Passage of, North Atlantic, 8

G.A Walker, 187
Garala, 14
Garinda, 105
GINZBURG, A.I. and K.N. FEDOROV, Phenomena on the sea surface, as studied from visual observations, 116, 190
Graiglas, 186, 187

Hampshire, 66

Harold La Borde, 58
HATCH, M. Sabean Odours, 197
Heavy weather:
North Atlantic, 170
Sea of Marmara, 7
South Atlantic Ocean, 98

Insects:
Eastern North Atlantic, 19
Equatorial, Atlantic, 186
Gulf of Mexico, 65
Indian Ocean, 20
Red Sea, 66, 109
Irma M, 24, 109

Jellyfish, Peruvian waters, 18
Jura, 112

La Pampa, 110, 180
Leicesterbrook, 19
Leonia, 175
Letters to the Editor, 37, 82, 134
Lightning:
Equatorial Eastern Atlantic, 10
Moçambique Channel, 175
Red Sea, 174
Line-squall, Western South Atlantic, 50
LIVESEY, R.J., Noctilucent clouds, 73
London Spirit, 64, 65
Loom of light, Equatorial South Atlantic, 23
Lunar eclipse and Aureole, Coral sea, 60

Maersk Harrier, 98
Mairangi Bay, 23
Malling, 57
Marine Life:
Arabian Sea, 180
Bass Strait, 106
Eastern North Atlantic, 56
South China Sea, 181
Marine Observer, The, 40 years ago, 133, 209
Melampus, 103, 109
Merchant Principal, 18
Meteors:
Arabian Sea, 23
Caribbean Sea, 66, 187
Indian Ocean, 68
North Atlantic, 67
Montarik, 25, 188
Moths:
Caribbean Sea, 109
Red Sea, 64
MOTTE, R. Ship damage and loss, A case for the weather routeing of ships, 31

NEALE, A.A. Weather forecasting: Magic, Art, Science and Hypnosis, 27
New Zealand Pacific, 51
Noctilucent clouds, 73, 112
Nor'easter, On the coattails of a, 69
North Atlantic low pressure record, A new, 122
Nosira Madeleine, 53, 61
Notices to Marine Observers:
Alterations to title of Marine Division Publication, 214
Appointment to the nautical staff of the Marine Division, 86
Britain-Australia Bicentennial Schooner Trust, 138
Changes to Ships' Code Group, 214
Colour photographs requested for publication, 41
Medal for a deed of Professional Merit performed at sea, 214
Nautical Institute Essay Competition, 215
Nautical Staff of the Marine Division, 215
New recruit to the Voluntary Observing Fleet, 86
Royal Institute of Navigation 1987 Conference, 138
The *Sea Swallow* Photographic Competition 1986, 86

Obituary:
BARR, CAPT. T.P., 84
GREGSON, CAPT. E.H., 210
Osaka Bay, 18, 185

Pacific Teal, 185
Pacific Universal, 10
Passage of front, North Atlantic, 8
Phenomena on the sea surface, as studied from visual observations, 116, 190
Photographs:
Bat, opposite 68
Bo'sun Bird, opposite 188
Britannia, The Royal Yacht, opposite 13
City of Edinburgh, opposite 80
City of Exeter, opposite 81
City of London, opposite 81
Cumulus, OWS, opposite, 13
Devastating results of a nor'easter, opposite 69
Greek and Persian fleets at the Battle of Salamis, opposite 129
Harold La Borde, opposite 112
Insect, opposite 68
Jellyfish, opposite 21
Lightning, opposite 205
Magnus Field oil platform, opposite 20
Moth, opposite 128
Nurse Shark, opposite 113
Pacific Princess, opposite 189
Presentation of barographs, opposite 204
Ravenscraig, opposite 112
Remuera Bay, opposite 112
Sea smoke and heavy seas, opposite 12
Sooty Tern, opposite 128
Wahoo, opposite 113
Waterspout, opposite 188
Pressure record, A new North Atlantic low, 122

Ravenscraig, 63
Refraction, Abnormal, Mediterranean, 59, 112
Report of work, 46
Resolution Bay, 106
Retirements:
BOWTELL, CAPT. B., 38
CALEY, CAPT. J.B., 83
CAUSE, Mr R.D., 210
HOOLEY, CAPT. J.W., 135
SAX, CAPT. J., 38
WALLER, CAPT. P.R., 211
WHYTE, CAPT. A.R., 84
WINTER, CAPT. M.J., 134
Reynolds, 12

St Helena, 67, 101
Sabean Odours, 197
Salmonpool, 99
Santos Star, 7
Satellite re-entry, Indian Ocean, 26
Seagair, 13
Seals, Gulf of St Lawrence, 17
Sekondi, 12, 17
Shark:
North Atlantic, 55, 105
South China Sea, 106
Ship damage and loss, A case for the weather routeing of ships, 31
Sir Alexander Glen, 22, 64
Sokoto, 50
Squall, South Pacific, 173
Stolt Stane, 182

Tor Bay, 23, 102
Trinidad and Tobago, 104
Typhoon 'Abby', South China Sea, 97

Valdivia, 58
Vigilant, 25

Waterspout:
  Caribbean Sea, 99
  Mediterranean, 174
Wave, Abnormal, North Sea, 13
Weather forecasting: Magic, Art, Science and Hypnosis, 27
Weather influences on battles and invasions, 128, 203
Weather routeing of ships, A case for, ship damage and loss, 31
Weather, Unstable, Western South Atlantic, 173
Wellington Star, 173
Whales see Cetacea
Willowbank, 103, 179
WITTEN, D.E. On the coattails of a nor'easter, 69

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